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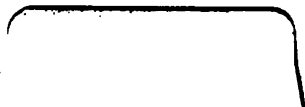
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To Dr. C. Lane

With the affectionate regards
of the author.

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SCIENCE AND MEDIEVAL THOUGHT

THE HARVEIAN ORATION DELIVERED BEFORE
THE ROYAL COLLEGE OF PHYSICIANS,
OCTOBER 18, 1900,

BY
THOMAS CLIFFORD ALLBUTT, M.A., M.D. CANTAB.

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HON. LL.D. GLASGOW, HON. M.D. DUBL., HON. D.Sc. VICT.,
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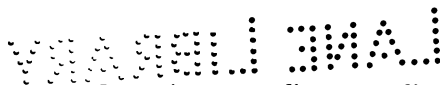


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B



“Duo enim sunt modi cognoscendi, scilicet per argumentum et experimentum. Argumentum concludit, et facit nos concludere quæstionem, sed non certificat, neque removet dubitationem, ut quiescat animus in intuitu veritatis, nisi eam inveniat via experimentiæ.” ROGER BACON, *Op. Majus*, Venet. 1750, p. 336.

A 42
1901

TO

SIR WILLIAM SELBY CHURCH, BART., M.D.

PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON,

THIS ORATION,

DELIVERED AT HIS REQUEST,

IS DEDICATED.

PREFACE.

ERRATUM.

p. 78, note 1, l. 19 ; *for* " were in orders, for the most part in holy orders ;" *read* " were generally speaking in holy orders ;"

is chilled, or a lustier offspring turns unnaturally to curse the dead ; so in their decrepitude lay the Middle Ages upon modern life ; and the Middle Ages were accursed, until certain pious men sought to reanimate their vestments and their formulas, and to set the hands back on the dial of the

PREFACE.

IN the Middle Ages the old world had passed, and the vision of a new world came near to the eager and passionate hearts of many peoples. Lincoln and Wells, Amiens and Chartres, Florence and Assisi tell us of the glory of that vision ; and bear witness of its flight : for with Gilbert, Galileo, Harvey and Newton the Middle Ages themselves became a phantom, and again the spirit of a new world appeared. Thus in the phases of time the world dies and is born again ; fulfilling greater destinies. But the new are born in the cold bed of the elder worlds, and the young life is chilled, or a lustier offspring turns unnaturally to curse the dead ; so in their decrepitude lay the Middle Ages upon modern life ; and the Middle Ages were accursed, until certain pious men sought to reanimate their vestments and their formulas,

1 to set the hands back on the dial of the

centuries ; as many minded man seeks wistfully to reanimate the simple wonders and beliefs of his childhood. Their ministry was no more than pious ; the method of modern history wins the fruits of the past while casting away the shadow of its withered branches. This comparative method, first applied to the art and romance of the Middle Ages, so that every dilettante may now discourse to us of their evolution, has been applied also to the thought of the period ; but its results, laid up in the closets of a few scholars, are as yet unfamiliar. It may then become one, who in no sense a scholar has strayed into these secret places, to try to distribute some lessons of the medieval thought which, to many of us, seems as sere and outworn as did the relics of Gothic shrines to our great-grandfathers. For, as in those medieval generations which lay nearest us the furnace had cooled, impatiently we had thrown metal and dross aside, and let our contempt for the dryness and pedantry of its latter days prevent our vision of the earlier time when the passion for knowledge bore up the world, and sought even to contain it. That dogma is not eternal is manifest to every wanderer in the streets of Toledo, yet the historian may well recall us to

the study of a time when, by mystical or intellectual inspirations, men strove eagerly to know the meaning of life, its origins, and its issues ; and may lead us to the discovery of the seeds and wells of its fertility. The Greeks prophesied that before man can determine his place and service in this world he must form some theory of the world as a whole ; the ages of faith prophesied that great deeds must be born of great faith and of great conceptions.

To those who live only in the past, or only in the present, there seems in the discriminations of the comparative historian to be a certain cold-bloodedness. Are not the ears of this critic, so aloof from the murmuring of creed and controversy, are they not deaf to the voices of the spirit which he would interpret to us ? A distinguished bishop who was among my hearers, with the fervour and gentle humour so well known in him, rallied me not for celebrating science but for putting religion to rout. Yet in our own day surely the argument is changed, not in form only but in very nature ; so changed by the conceptions of evolution, which have entered the mind of churchman and layman alike, that not a few

speculative beliefs are changing sides without the knowledge of the disputants; and he who thinks himself a defender of the faith may have joined the revolt. But if we no longer carry the colours of the troops of the past we shall collect our lessons from its strategies; and for one of these lessons a prelate of the King will give thanks with me, that his supremacy has palsied the arm of the inquisitor to strengthen that of the apostle.

An unsystematic reader of a subject finds it out of his power to make due acknowledgment of the help and advantage derived from expert authors. Much of the matter had seeded itself insensibly in his brain in the course of general reading and conversation; much of it again had been obtained more carefully from sources now forgotten. To the following authors I know I am profoundly indebted, as I am to many others to whose names and works I can now give no reference :

Hauréau, *La Philosophie Scolastique*, Ed. 1872; Jowett, *Dialogues of Plato* (vol. III. p. 523); Jourdain (Amable), *Recherches critiques*, Paris 1848; Jourdain

(Charles), *Excursions historiques*, Paris 1888 (and the *Philosophie de St Thomas* of the same author); Ampère, *Histoire litt. de la France avant le xii^{me} siècle*; Brucker's *Historia Critica Philosophiæ* (English Ed., 1791); Renan, *Averroès*, Paris 1866; the *Philosophie périp.* apud Syros; and the *Peuples Sémitiques dans l'histoire de la civilisation*, of the same author; Roger Bacon, *Westminster Review*, 1864, two Articles (by Thomas Marshall, M.A. Oxon.); Schmidt, *Essai sur les Mystiques du xiv^{me} siècle*; Benn, A. W., *The Greek Philosophers*, London 1882 (and many helpful essays in periodical literature); Zeller, *Die Philosophie der Griechen*, 1881; Krische, A. B., *Theologische Lehre d. Griechischen Denker*, Göttingen 1840; Ueberweg, *Grundriss d. Gesch. d. Phil. des Alterthums*, Berlin 1867; Gerlach und Traumüller, *Gesch. d. physik. Experimentierkunst*, Leipzig 1899; Rashdall's *History of Universities*; Haeser, *Geschichte der Medicin*, Jena 1875-82; Baas, J. H., *Gesch. d. Medicin*, Stuttgart 1876; *Idem*, *Die geschichtliche Entwicklung des ärztlichen Standes*, Berlin 1896; Charles Daremberg (all his works); Roussetot, *Études sur la philosophie dans le Moyen Age*, 1840; Pattison, *Casaubon*, 1875; Meunier, Francis, *Essai sur la vie et les ouvrages de Nicole Oresme*, Paris 1857.

Descartes, *Epist. Cartes.* 4to. Amst., 1668; Plumpius, *Fundamenta Med. Fol.* Lovan., 1652; Sylvii *Op. Omn.*, 1679, p. 875; Haller, *Elem. Physiol.*, 1757, I. 3; Tiedemann, *Physiologie de l'homme*, Paris 1831, I. 41; Delle Chiaja, *Instituzione di Anatom. e Fis. Comp.*, 1832,

i. 13. (The six last works are cited as being especially useful, among many others, to show the extent to which modern physiology, from Harvey onwards, is based upon vivisection; and that it could not have arisen or thriven otherwise. It was by the test of many vivisections that Plumpius was led to the honourable withdrawal of his opposition to Harvey.)

INTRODUCTION¹.

IN the many Harveian Orations which have been delivered since the death of the founder of modern physiology the direct aspects of his honour and of his work have been exhausted; of late years the orators have concerned themselves with indirect aspects. Some of my friends have said to me that they lack a perspective view of Harvey and his work; that even highly educated men have little sense of his relation to medieval thought, or of the evolution of medieval into modern thought. Of the several stars of the constellation—of Copernicus, Gilbert, Galileo, Harvey—they had some knowledge; but how came Harvey to be at Padua? how did science spring up in North Italy? did science arise out of the womb of medicine, or contrariwise? why

¹ To bring the oration within the time allotted, this portion, and the paragraphs on astrology added as an appendix, were omitted. For the same reason the paragraphs on scepticism (p. 82) were also omitted but by inadvertence have held their continuity in the text. It is customary to print the text as delivered; and this must be my excuse for the cumbrous apparatus of notes, much of which might have been taken into an enlarged text. The notes are necessary to fortify statements which orally may pass, but do not satisfy a reader.

did natural science not flourish in the thirteenth century, and was it not a great misfortune for Europe that it did not then flourish? what were the systems of thought which in the Middle Ages preceded, encouraged or thwarted the travail of the human mind, and what of good or ill do we owe to them? These and such questions it seemed not unfitting that a Harveian Orator of this latter day should consider. Now on the philosophy of the Middle Ages, and on its relation to the era of positive science of which Harvey was perhaps the chief pioneer, there lay in a drawer in my cabinet the confused and occasional notes of many years. An interest in this thorny subject, sown in my mind at first by accident, and reawakened by these enquiring friends, had for me the charms of an old fancy, and I trust some brief essay thereon may have a temporary service; if, that is, I can touch the imagination of my hearers, and after some broken fashion bring before them a vision of the nations swayed hither and thither upon the face of Europe by a thirst for knowledge of a kind different, both in its methods and in its aims, from our own.

This oration cannot have the merit of an original study. Had I the equipment I have not the leisure to carry my investigations to the sources. Yet I may have attained to some maturity of judgment herein by long occupation of my mind since, in 1863, my old friend Mr Thomas Marshall of Leeds, sometime of St John's College, Oxford, interested me in the life and work of Roger Bacon, the only eminent forerunner of the great naturalists of the seventeenth century.

The art of the Middle Ages and the social and political history of the time have fascinated modern Europe; for medieval thought, though its phrases survive in their mouths, few persons have shown any care: yet to these conflicts we owe what we are. No great battles of mankind have been fought in vain; none of its great captains has deserved oblivion. Yet we shrug our shoulders at their uncouth or outlandish names; we assume that from their chairs there issued naught but rhetoric, casuistries and fallacies, and that their multitudinous disciples were silly moths.

Each period of human achievement has its phases of spring, culmination, and decline; and it is in its decline that the leafless tree comes to judgment. In the unloveliness of decay the Middle Ages are as other ages have been, as our own will be: but in those ages there was more than one outburst of life; more than once the enthusiasm of the youth of the West went out to explore the ways of the realm of ideas; and, if we believe ourselves at last to have found the only thoroughfare, we owe this knowledge to those who before us travelled the uncharted seas. If we have inherited a great commerce and dominion of science it is because their argosies had been on the ocean, and their camels on the desert. "Discipulus est prioris posterior dies"; man cannot know all at once; knowledge must be built up by laborious generations. In all times, as in our own, the advance of knowledge is very largely by elimination and negation; we ascertain what is not true, and we weed it out. To perceive and to respect the

limits of the knowable we must have sought to transgress them. We can build our bridge over the chasm of ignorance with stored material in which the thirteenth century was poor indeed, we can fix our bearings where then was no foundation ; yet man may be well engaged when he knows not the ends of his work ; and the schoolmen in digging for treasure cultivated the field of knowledge, even for Galileo and Harvey, for Newton and Darwin. Their many errors came not of indolence, for they were passionate ; not of hatred of light, for they were eager for the light ; not of fickleness, for they wrought with unparalleled devotion ; nor indeed of ignorance of particular things, for they knew many things : they erred because they did not know, and they could not know, the conditions of the problems which, as they emerged from the cauldron of war and from the wreck of letters and science, they were nevertheless bound to attack, if civil societies worthy of the name were to be constructed. How slow in gestation is the mother of truth we may see by comparing the schoolmen of the second medieval period with those of the first ; in the enlargement of their view, the better furniture of their minds, and the deeper meaning of their distinctions : and when we compare with these later schoolmen the naturalists of the seventeenth century, we find not new acquirements only but also a new direction of the pursuit of truth.

It seems hardly comprehensible that great and stable societies have been built up on transcendental schemes of thought, upon conceptions poised as it were in the air.

Without a system of morals no civil society could exist ; yet if mankind must have waited for civil polity until some such system were built up from below, of scientifically tested materials, social constructions would have been virtually impossible. In morals, as in the arts, the art precedes the science ; the intuitions of genius imagine social schemes of provisional validity, and new and lofty standards of fitness. But a social fabric thus born of a vision can bear no rough handling ; and even the solid builders who would make a more permanent foundation upon positive conceptions, while seeking more or less deliberately to underpin the fabric, may, and often do, shake it to ruin.

Hence in all guardians of morals the dread of meddling with the reigning vision of truth ; hence its sanctity, that no man shall try the stuff of which it is made. And the dangers of heresies from within are more fearful than those of alien attacks ; social cohesion, the end of it all, is thereby more exposed to disintegration. Yet nevertheless, as the generations of men change, and as knowledge increases, men see from new points of view ; and thus while for some the reigning vision retains its apparent solidity, for others its rays are broken or dissolved. Even John Henry Newman was compelled to teach the relativity of truth, and that a doctrine of development must be accepted. For every provisional synthesis then the time must come when the apparition of truth can no longer command united allegiance, and criterions begin to encroach upon sanctions. Broader and more stable foundations have, it is true,

been rising almost insensibly, yet it may be long ere the superstructure rise into the heavenly light ; in the lower work many will see no beauty and no hope, others will see safety in its enlargement and solidity. By these indeed the visions of the imagination are apt to be forgotten, or in the pressure of intellectual verification even despised ; the mean level of conception may not indeed be lower, it may haply be higher, yet the highest, wherein truth may be revealed by illumination, is not divined in its full force, abundance and life. Great seers are wont to leave to others to find out, or even to care, what bottom they stood upon ; yet only through transitory periods of a humbler duty than theirs can the bases be laid and enlarged for times of richer fruition. One of the profoundest of modern sayings was that of Freeman—that the end of modern material progress is to bring large societies up to the level of small ones.

This is the day of a great celebration ; that on this anniversary I am worthy to take a place in the succession of your Orators is more than I dare to believe, that you have deemed me worthy is my encouragement. In private duty also I am bound to honour one of the greatest of the sons of the University of Cambridge, and the greatest member of the ancient and honourable house of Gonville and Caius College.

In some respects I am ill equipped for my office; of the history of the practice of Medicine from the time of Galen to the time of Harvey I am almost ignorant, I fear wilfully ignorant. Well indeed may we turn our eyes away from those centuries wherein one of the chief callings of man fell into unexampled and even odious degradation; yet I trust that in me this ignorance and this aversion may be compensated by some familiarity with the history of thought in the Middle Ages, a familiarity acquired during thirty-six years of abiding interest, and occasional study.

The discovery of the circulation of the blood by William Harvey is commonly regarded among scientific discoveries as pre-eminent if not unique. I can quote but two opinions on this matter, both taken beyond our own land. In France, Dr Dar-emberg exclaims "Voici Harvey! Comme au jour de la création le chaos se débrouille, la lumière se sépare des ténèbres!" In Germany, Dr Baas says that Harvey stands alone in respect of the world of life; that his discovery of the inner working of the microcosm takes a place equal to, if not indeed higher than, those of Copernicus, Kepler and Newton in respect of the macrocosm. It will be

my endeavour to show that these judgments are historically justifiable.

To put the discovery of the systemic circulation of the blood in its true light, we must have some notion of the history of philosophy, science and medicine. Medicine, and herein it is in contrast with Theology and Law, had its sources almost wholly in the Greeks. Not only in the doctrine of the four elements of Empedocles, a doctrine which has survived almost to our own day¹, and in the physical theories of Heraclitus and Leucippus, did medicine, for good or ill, first find a scheme of thought, but in the schools of Hippocrates and of Alexandria it was based also, and far more soundly, upon natural history and anatomy. The noble figure of Galen, the first experimental physiologist and the last of the great Greek physicians, portrayed for us by Dr Payne in the Harveian Oration of 1896, stood eminent upon the

¹ The "humoral doctrine" is imperfectly known. The four *elements* are earth, water, air, fire; the four *qualities* are hot, cold, moist, dry; the four *humours* are blood, phlegm, yellow bile, black bile. By permutation of these were obtained the endless elaborations of the galenist doctrine which for many centuries blinded Europe not to the truth only, but also to the clinical and physiological methods, example, and attainments of Galen himself.

brow of the abyss when, as if by some convulsion of nature, medicine was overwhelmed for fifteen centuries. To the philosophy of medicine, Galen had given more than enough ; to its natural history he had contributed in the following of Hippocrates ; to its discoveries he had given the greatest of all means of research, individual genius ; to its methods he had given, but in vain, that indispensable method, practised first perhaps in history by Archimedes and the Alexandrians, of verification by experiment ; a method, after Galen, virtually lost till the time of Gilbert, of Galileo and of Harvey.

In the growth of human societies small civilisations, however exquisite, have been sacrificed to the formation of vaster and vaster congregations of men ; thus only, it would seem, is an equilibrium to be reached of sufficient stability for the highest ends of mankind. Greece, beautiful as was her bloom, penetrating as was her spirit, perhaps because of her very freedom of thought, never became a nation ; her city states were too wilful to combine. The Macedonian power broadened the foundation of polity eastward and westward ; and this work was carried as far perhaps as sword and fasces could carry it by the power of Rome.

But even the Roman peace, bought as it was at the cost of learning and the arts, was but a mechanical peace ; in the wilder, more turbulent and more heterogeneous peoples of the later Empire the bodies but not the wills of men were in subjugation. The great system of Roman Law, which Numa, the Moses of Rome, had invested with supernatural awe, had become but an external rule ; even in Rome herself, poorer in people, poorer in commerce, poorer than ever in ideas, the sanction of patriotism was failing, and her citizens were held together for the most part by their baser and more dangerous passions¹. For Eastern Europe the University of Constantinople established a compact and uniform system of thought, subtle prolix and acquisitive rather than original or profound ; but in the West, under the Frank and later Northern devastations, the very traditions of learning and obedience were broken up ; schools were closed, and even the art of writing was almost lost. Then it was that the cohesion and development of Western Europe

¹ "Nec ullum satis validum imperium erat coercendis seditionibus populi, flagitia hominum ut cæremonias deum protegentis." Tac. Ann. III. 60.

were saved by a new and a wonderful thing. From the East, the home of religions, had spread, like an exhalation, Christianity, that religion which proves by its survival that it is the fittest sanction for the will of man. This religion, entering as a new spirit into the ancient fabric of Roman Empire, was to hold men's service in heart and soul as well as in body; yet to this end no mere mystic or personal religion could suffice: clothing itself with the political and ritual pride and even with the mythology of the pagan Empire it inspired a new adoration; but it imposed also upon Europe a catholic and elaborated creed. To preserve the authority of the common faith not only must every knee be bowed, not only must every heart be touched, but to build and to repair its fabric every mind must also bring its service. How the scheme of the Faith was built up, how oriental ecstasy and hellenistic subtlety, possessing themselves of the machinery of Roman pomp, were wrought to this end, we may briefly consider.

As, politically, under Diocletian and Constantine the ancient world gave place to the new, so in the third century philosophy was born again in

neo-platonism¹, the offspring of the coition of East and West in Alexandria, where all religions and all philosophies met together. The world and the flesh were crucified that by the spirit man might enter into God². Pure in its ethical mood, neo-platonism, says Harnack, led surely to intellectual bankruptcy; the irruption of the barbarians was not altogether the cause of the eclipse of natural knowledge: to transcendental intuition the wisdom of the world had become foolishness. Yet even then, as again and again, came the genius of Aristotle to save the human mind. The death of Hypatia was the death of the School of Alexandria, but in Athens neo-platonism survived and grew. Proclus, ascetic as he was, was versed also in Aristotle; and he compelled the Eastern mysteries into categories: so that on the closure of the School of Athens by Justinian (A.D. 529) a formal philosophy was bequeathed to the Faith; the first scholastic period was fashioned, and the

¹ It must not be supposed that the idealism of Plato and the mysticism of the East were alike, or even akin. Plato was a Greek; his mind, as we appreciate such qualities, was sane and lucid: he had no yearning whatever for absorption in the Infinite; but rather, like Aristotle, for a noble life.

² " Oftener on her knees than on her feet
Died every day she lived." Macbeth iv. 3.

objects and methods of enquiry were determined for thirty generations. From Aristotle Europe adopted logic first, and then metaphysics, yet both in method and in purpose Origen and Augustine were platonists; rationalised dogma lived upon dialectic, and conflicted with mysticism; but logic, dogma and mysticism alike disdained experience.

Thus, no mere external sanction, stood the Faith; threefold: from the past it brought its pompous ritual, it appealed by its subtle dogmatic scheme to the intellects, and by its devotion to the hearts of men. Through the mirage of it, when its substance had waned, Copernicus, Galileo, and Harvey had to steer by the compass of the experimental method. This was their chief adversity, and of other adversities I have to speak.

The visitor to the Dominican Church of St Catherine at Pisa will see on its walls St Thomas of Aquino with the Holy Scriptures in his hand; prostrate beneath him is Averroes with his Great Commentary, but beside him Plato bearing the *Timæus*. It was the fortune of the Faith that, of all the treatises of Plato, the *Timæus*, the most fantastic and the least scientific, should have been set apart to instruct the medieval

world ; that the cosmical scheme of the *Timæus*, appavelled in the Latin of Chalcidius,—for there were then no Greek texts in the libraries of the West,—should for some 500 years have occupied that theoretical activity which Aristotle regarded as the highest good of man¹. Again, those works of Aristotle which might have made for natural knowledge fell out of men's hands², while in them, as Abélard tells us of himself, lay the *Categories*, the *Interpretation*, and the *Introduction* of Porphyry to the *Categories*, all in the Latin of Boetius³ ; treatises which made for

¹ I see in recent reports of Egyptian exploration that at Oxyrhynchus Plato was represented with curious persistence by the *Phædo* and the *Laches* ; and these treatises appear in the early Fayyum papyri.

² A few axioms, collected from the physical and metaphysical treatises (perhaps by Cassiodorus from Boetius), were current from an early date. The translations of Boetius must for a time have lain in some neglect ?

³ Alcuin had but a translated abridgment or summary of the *Categories*, attributed to Augustine ; and in a MS. of the tenth century we find no more than this. Boetius' full translation of the *Categories* was not current till the end of this century, when all the logic of Aristotle was in the hands of the doctors. In the earlier Middle Ages, as in the writings of John of Salisbury and of William of Conches, we hear even more of Boetius than of the master himself. Virgil, Seneca and Cicero also were the sources of much of the culture of this period. Alcuin was a grammarian ; he taught

peripatetic nominalism, but whereby men were versed rather in logic and rhetoric than in natural science. Thus Plato's chimera of the human microcosm, a reflection of his theory of the macrocosm, stood beside the Faith as the second great adversary of physiology.

The influence of authority, by which Europe was to be welded together, governed all human ideas. As in theology was the authority of the Faith, so in the science and medicine of the first period of the Middle Ages was that of the neo-platonic doctrines, and, in the second period, of the Arabian versions of Galen and of Aristotle; furthermore in this rigid discipline metallic doctrine almost necessarily overbore life and freedom. It is not easy for us to realise a time when intellectual progress—which involves the successive abandonment of provisional syntheses—was unconceived; when truths were regarded

from Priscian and Donatus, improved the eighth century Latin, and probably made Virgil and Cicero known in Gaul and Britain. He knew but little Greek, as we infer from his quotation of the names of the Categories. Erigena knew more Greek and carried some of it to the Court of Charles the Bald. See note 2, p. 65. Alcuin probably did not visit Ireland. Boetius had translated also both Analytics and the Topics.

as stationary ; when reasons were not tested but counted and balanced ; when even the later Averroists found final answers either in Aristotle or in Galen¹. Thus in the irony of things it came to pass that Harvey was withstood by the dogma of Galen who, in his own day, had passionately appealed from dogma to nature.

Porphry of Tyre, who lived in the 3rd century, may be called the founder of both Arabian and Christian scholastics. He was an Alexandrian, but of peripatetic rather than platonic opinions. In the *Isagoge*, or Introduction to the *Categories*, already mentioned as translated by Boetius about 500 A.D., he set forth plainly a problem which during the Middle Ages rent Western Europe asunder ; a problem which, says John of Salisbury²,

¹ Yet Roger Bacon seems to have apprehended both progress and the relativity of truth. Before Newman, he declared that God makes no full revelation but gives it in instalments ; and in another passage he speaks of the judgments of Aristotle, and of other great teachers, "*secundum possibilitatem sui temporis.....aliud tempus fuit tunc, et aliud nunc est*"—a remarkable saying. Of the Saints he says "they had their time, we have our own." Vid. also note, p. 80.

² Modern French historians do us the honour of annexing our heroes ; in respect of the scholars of the Middle Ages M. Charles Jourdain has set, or followed, this example. John of Salisbury, that charming child of renaissance, born out

engaged more of the time and passions of men than for the house of Cæsar to conquer and govern the world; one indeed which even in our day and country is not wholly resolved.

The controversy lay between the Realists¹ and of due time, was first claimed as a Frenchman; then, as this "provenance" becomes untenable, he, and others, are called "Anglo-French." The University of Paris in the xiiith century was no more France than Rome was Italy. In our sedentary arable life we do not realise the nomad habits of our forefathers. Edward the First would inhabit six distant castles in less than as many weeks; indeed Great Britain itself was then no island. The heroes, nay the armies, of Froissart's Story fly about the world in their seasons like migrating birds. All keen scholars of the West went to the University of Paris, the daughter of kings and popes, and the intellectual centre not of a strip of kingdom between Anjou and the Empire, but of Europe itself. And of the scholars of Paris, Englishmen were, we hear, the most turbulent, but the boldest in argument and the most greedy of learning; this last character perhaps it is that now-a-days looks least English. Kuno Fischer admires the procession of great Englishmen down the highway of medieval thought, from Erigena to Francis Bacon. John was born at Salisbury, spent thirteen of his early years at the University of Paris, the best of them in the stormy service of Thomas Becket, and but the last five as Bishop of Chartres. We do not call Lanfranc an Englishman, nor even Adrian the Fourth an Italian.

¹ The name Realism has been improperly used—improperly because previously engaged—to signify the conception of an objective world, from the play of which our impressions arise, and of which our impressions are, if not likenesses, at any rate symbols, as opposed to the name "Idealism" which, with a like violence, has been turned to signify the conception that

the Nominalists; and the issues of it, in the eleventh century,—at which time the “Dark Ages” passed into the earlier of the two periods of the Middle Ages,—were formulated on the realist side by William of Champeaux, while the Breton Rouselin, or Roscellinus, had the perilous honour of defining them on behalf of the nominalists¹. To see the depth of the difference we must step back a little, to a time when metaphysics and psychology were not distinguished from other spheres of science², and all research had for its object the nature of being. Plato himself held ideas not as mere abstractions but in some degree as creative powers; and we shall see how potent this function became in the thought of the Middle Ages when,

the universe of things is but a picture produced by the evolution of the phenomena of consciousness. The proper names for these opposite conceptions are of course Noumenalism and Phenomenalism. Realism proper as a habit of thought, whatever may have been its provisional uses, is now a mischievous habit; noumenalism is a harmless amusement.

¹ Roscellinus, the Roger Bacon of the eleventh century, learned, rebellious, lucid and heroic, withstood the Church for philosophy as did Bacon in the thirteenth for natural science. It would seem that in heroism at any rate Abélard was below his master.

² Vid. p. 50.

in the ardour of research into the nature of being, the modes of individuating principles were distinguished or contrasted with an ingenuity incomprehensible to Plato or Aristotle, or at any rate undesired by these greater thinkers. Aristotle avoided the question whether form or matter individuate; he held that there is no form and no matter extrinsic to the individual. But by the medieval realist every particular, every thing, was regarded as after some fashion the product of universal matter and individual form. Now "form" might be regarded, and severally was regarded, as a shaping, determinative force or principle, pattern type or mould, having real existence apart from stuff, or, on the other hand, as an abstract principle or pattern having no existence but as a conception of the mind of the observer. The realists roundly asserted that form is as actual as matter, and that things arise by their participation—without whiteness no white thing, without humanity no man; and not individuals only: for the realist, out-platonising Plato, genera and species also had their forms, either pre-existent ("universalia ante rem"), or continuously evolved in the several acts of creation ("universalia in re"). Indeed for the

extreme realist every "predicamental modality" was "*aliquid ens separatum*"; for instance, the soul, the active intellect, the passive intellect, and so on: conversely, by fusing idea with will, for other philosophers realism would get pushed back into efficient reason or divine will, and almost vanish¹. By this latter route the Sorbonne, originally opposed to the Thomists, became nominalist after all; as did those once pious realists the Augustinians and Cistercians. Setting aside then the extreme nominalists, who would have dissolved thought by declaring all creatures to be so individual as to be incomparable,—"*pulverising existence into detached particulars*," as some one has put it—and that names of kinds are mere nouns, or indeed mere air ("*flatus vocis*"), the prevalent nominalists were content to deny to ideas, forms, principles, or abstractions any other existence than as functions

¹ The opponents of the theory of the Mass are apt to charge the Roman Church with the proposition that therein the elements are changed into "real" flesh and blood. In the nineteenth century, as in the thirteenth, this Church has not, I believe, determined whether the "real" substance be corporeal or incorporeal, separable or inseparable from the sensible properties of things; whether in a word it be something or, as many of us would say, nothing at all. Spinoza regarded "substance" as intelligent and extended.

of the human mind—as subjective conceptions. For Ockham, says Hauréau, an idea was but a modality of the thinking subject. Abstractions then for these thinkers were but mental machinery for analysis of the concrete. Aristotle was as obscure and inconsistent in his language herein, and often elsewhere, as he was profound and scrupulous ; but when his works came to be studied as a whole, and in the original tongue, the influence of his method, rather than the close consistency of his language, told against realism : virtually he was a conceptualist, and he found reality, where Plato denied it, in the particular object of sense¹.

¹ Thus it was difficult to claim his authority for one side or the other. The metaphysical treatises were not known till the later part of the twelfth century. (See p. 75, note 2.) At the outset of the *Physics* Aristotle discusses what nature is in itself, and defines first elements ; in the *Second Analytics* on the other hand, although thinking of science as deductive and expository, he strongly opposes the primary existence of ideas, though these are predicable of many individuals. By excess of logical formations, the division of properties, the use of such terms as “*γένη ὑποκείμενα*,” &c. &c., he laid himself open to misconception, and so was readily platonised by his commentators. It would seem indeed that for Aristotle universals were not merely propositions obtained by negation of individual variations, but something more active. A *νόησις* became somehow a *ποίησις* ; e.g. “*ἡ δημιουργήσασα φύσις*.” His position may be appreciated briefly thus :—In the *Categories* Aristotle speaks of individuals as primarily existent,

Even Francis Bacon, who was deeply indebted to Aristotle, never extricated himself from the tangle of form, cause and law¹.

Now this was a great argument, no empty dispute; the bones of dead controversies cumber the ground, but no controversy was empty which moved profoundly the minds and passions of men: both for ecclesiastical and secular thought the dispute was grave. While realism was essential to the Church—for instance, on realist grounds St Anselm defended the medieval doctrine of the Trinity against Roscellinus; the Church herself

while in Met. Z, and elsewhere, the primary existent is the form. The inconsistency is, however, more apparent than real; for in the Categories it is the individual so far as he represents his natural kind which is primarily existent, whilst the form which in the Metaphysics is primarily existent occurs only in the individual. This terse appreciation is one of my many debts to Dr Jackson.

¹ It were almost to be desired, for our own lucidity, that we could get rid of the words cause and law, and use language significant of order only. Aristotle's influence has weighed heavily in favour of studying "Causes" rather than sequences; thus it is hard to clear our own minds, and impossible to clear the minds of our pupils, of a genetic notion of causation—that an effect comes, as it were, from the womb of its causes. Even Ockham taught as if causes contained their effects. Mr Marshall (West. Rev. loc. cit.) is of opinion that Roger Bacon by his "*non oportet causas investigare*" intended to confine scientific thought to the relations of phenomena.

claimed a real existence apart from the wills of successive generations of individual and variable men; she taught that Man had fallen not only in many or all individual cases, but as a kind having a real existence¹, and again that in the Mass there is change of hypostasis²—while then realism was essential to the Faith, yet if forms pre-exist (“ante rem”) then the acts of God must be predetermined—“fatis” non “avolsa voluntas”; or if forms are only “in re” God must be form, living in each and every act and thing, which is Pantheism (“materia omnium Deus”): an impersonal conception and a dissolution of dogma which the Church must and did abhor. “Pessimus error”—there is the abyss, cried Albert, avoiding it by dialectical juggles. Erigena, the brilliant prophet and protestant³ of the first period of

¹ As St Anselm put it, “Participatione speciei plures homines sunt unus homo.” Out of humanity individual men proceed.

² Vid. p. 32, note.

³ Erigena, “the miracle of the Holy Ghost”; a figure of almost mythical grandeur, arising in the far west, full of new learning, of lyric enthusiasm, and heroic courage. He did not protest, with St Columba, against the Papacy only; he protested against authority, and he protested against mighty ignorance; neither of which should withstand the persuasion of right reason. “Ratio immutabilis...quæ...nullius auctoritatis adstipulatione roborari indiget.” His works were proscribed and burned.

the scholastic philosophy, was virtually a pantheist after the pattern of Parmenides¹; as Spinoza was the last great realist. David of Dinan again was such a pantheist, though luckily for him the Church did not find it out till he was dead; and he was martyred only in his bones. Indeed the great Robert of Lincoln barely escaped the accusation of pantheism under the wing of Augustine. The heresies of David, and of Amaury, caused the reaction of the first years of the 13th century against Aristotle. Amaury seems indeed to have cleared out Christian dogma pretty thoroughly, and to have preached the coming of science as the "third age" of the world. Many of his followers were sent to the stake; by the Synod of Paris (1209) the works of Aristotle were proscribed, and many copies of them burned. This proscription was virtually withdrawn by Gregory the Ninth in 1231; and Hales, Albert and St Thomas devoted themselves again to the study of Aristotle, and

¹ The one, to which alone Parmenides and Melissus attributed existence, was a material although an incorporeal unity. We must beware of accepting "matter" in the current dualist sense; for Aristotle himself *ἕλη* was hardly distinguishable from *δύναμις*!

established his supremacy¹. Indispensable then as realism was for the Church, its creed, and

¹ With every allowance for the phases of church and school in successive academical generations it seems strange that in 1209 Aristotle should have been forbidden under excommunication, and in 1231 restored to such favour that for the disciples of Albert and St Thomas the master almost attained the authority of a father of the church; the explanation probably is that "Aristotle" meant for a time the paynim interpretations of Toledo, particularly of the Physics (the Metaphysics were not translated from the Greek till about 1220); and meant not this only, but also liberal quotation and incorporation of the writings of Arab philosophers. To show how learning, even in the University of Paris, lay under ecclesiastical control, some extracts from the Edicts of the Synod of Paris and of Gregory the Ninth may be cited in illustration:—After directing that "*Corpus magistri Amaurici extrahatur e cimiterio, et projiciatur in terram non benedictam*" the Synod farther orders that the "*Quaternuli*" ["*Quaternuli*" is translated by Ducange, *Quatuor quartæ chartæ, seu octo folia*: i.e. the octavos] *magistri David de Dinant,.....afferantur et comburantur; nec libri Aristotelis de naturali philosophia, nec Commenta legantur Parisiis, publice vel secreto. Et hoc sub pœna excommunicationis inhibemus.....De libris theologicis scriptis in romano, præcipimus quod episcopis diocesanis tradantur, et Credo in Deum et Pater noster in romano, præter vitas sanctorum.*" The order two years later confirming these prohibitions differs but in form. Even the Bull of Gregory in 1231, relieving the schools of this proscription, says, "*Ad hæc jubemus ut magistri artium unam lectionem de Prisciano et unam post aliam ordinarie semper legant, et libris illis naturalibus, qui in concilio provinciali ex certa causa prohibiti fuere, Parisiis non utantur, quousque examinati fuerint, et ab omni errorum suspicione purgati.*" The pope adds paternally, "*Magistri vero et scholares theologiæ, in facultate quam*

its sacraments, yet therein it found itself in a dilemma between the conceptions of a Creator working under conditions, and of a spirit immanent in matter ; and when theological philosophy culminated in St Thomas, and was fixed by him as it now rules in Rome, this difficulty was rather concealed in his system than resolved¹. Every scheme of

profidentur, se studeant laudabiliter exercere, nec philosophos se ostendant, sed satagant fieri theodoti: nec loquantur in lingua populi, et populi linguam hebræam cum azotica confundentes" [azotica or arethica means the profane tongue (Ducange); Hebrew being a Sancta lingua]. The pantheistic outburst of the later twelfth century, although deriving in part from Erigena, was probably fed by the commentary of Alexander of Aphrodisias. This commentary was widely read in Arabic and Arab-latin translations, the latter of which were made, as we know (v. A. Jourdain, p. 123 and seq.), by Gerard of Cremona (d. 1187). Alexander's more material interpretation of *ἅλῃ* involved the return of All into God; hence no resurrection, no future life. In his followers these doctrines become grosser and grosser, and, fused with other Arabian doctrine, prepared for and afterwards strengthened the Averroism of Padua, in the xv—xvith century, in which system it was taught that the universal soul, dipping for the time into the individual man, is at death resumed into the universal soul. This virtual denial of personal immortality was of course bitterly resented by the Church. (Vid. p. 68, note.) Thus from the thirteenth century onwards pantheistic infidelity survived and even defied the menaces and the punishments of the Church.

¹ Both Albert and Aquinas were inconsistent. Hauréau points out that St Thomas was a vitalist in physics, an animist in metaphysics, a nominalist in philosophy, and a realist in

thought must make some declaration on the nature and place of universals ; the problem was no hair splitting¹, it dealt with the very nature and origin of being ; it agitated the minds of thinking men at a time of the most fervid and widespread enthusiasm for knowledge which the Western world has ever known,—at a time when Oxford counted its students by thousands, and when in Paris a throng athirst for knowledge would stretch from

theology. “Il a cherché à reconcilier des morts (i.e. Plato and Aristotle) qui, toute leur vie, se sont contredits.” But even sceptics contradict themselves ; and it is fair to add that St Thomas pushed universals back to immanence in the Divine mind. For Plato the ideas are thoughts of universal mind ; for Aristotle God, or Nature by its thoughts or plans determines the lines of phenomena : thus Plato and Aristotle were more alike than Thomas knew, or Hauréau admits. There was no such thing of course as The Scholastic Philosophy, of which I read again but the other day in a modern work. Scholasticism is the very various teaching of the schools of the xi—xvth centuries ; though its general tendency was to search rather into the origin and nature than into the functions of being. The philosophy of the thirteenth century on the whole was eclectic ;—though perhaps eclectic by confusion rather than by reconciliation. The rule of authority prevented an appreciation of the relative values of opinions ; the recognised authorities were equally true, and had to be dovetailed together somehow. Critical interpretation had not begun.

¹ The objection should not lie against hair splitting, for thought cannot be too penetrating ; but against the splitting of imaginary hairs.

the cloisters of the Mathurins to the faubourg of St Denis¹; and, in respect of our theme of this day, we shall see that even Harvey was embarrassed by certain aspects of it.

For, to resume, closely allied to the argument concerning universals was that concerning "form and matter." Whether the terms used were "form and matter," force or energy or "pneuma" and matter, "soul or life" and "body," "determinative essence and determinate subsistence," "male principle and female element," "archæus and body," the potter and the clay of the potter; or whether again they were "type and individual," "cause and effect," "law and nature," "becoming and being," or even the "thought and extension" of Descartes, the riddle lay in the contrast of the static and dynamic aspects of things; in the incessant formation of variable and transitory individuals in the eternal ocean of existence².

*"Spiritus intus alit, totamque infusa per artus
Mens agitat molem, et magno se corpore miscet."*

¹ M. Charles Jourdain thus describes the procession of Rector, doctors and disciples of the University of Paris at the beginning of the fourteenth century. At the end of this century its decay began.

² For Aristotle the principle of individuation was matter and form (vid. note, p. 33); for Averroes it was form; for

For early thinkers, untrained in the methods and unaware of the limits of thought, even for the great and free thinkers of Greece, a captivating analogy was irresistible¹; while inventing schemes of thought they believed themselves to be describing the processes of nature. Moreover it has been the temptation of philosophers of all times, and even of Harvey himself than whom none had put better the conditions of scientific method, to suppose that by means of abstraction kinds may be apprehended; that thus they may get nearer to the inmost core of things; that by purging away the characters of individuals they may detect the essence and cause of individuation

St Thomas it was matter. For all "vitalists" the identity of form, soul and life is essential; thus Stahl regarded soul as bestowing on body all activity, as determining all vital functions. In Aristotle *ψυχή* is untranslatable = *anima* and *animus*—soul and vital principle. *Πνεῦμα* again in various writers may mean anything, from air to spirit or other essence; cf. Arist. *De Generat. An.* II. 3, and the "aura" of Harvey, and even of Haller in the same connexion as the fertilising element.

¹ Not for all, not for the greatest of them! Aristotle, in vain, warned later generations against prophesying what seems likely, instead of looking to see how things come about:—"οὐκ ἀληθῆ λέγοντες, ἀλλὰ μαντευόμενοι τὸ συμβησόμενον ἐκ τῶν εἰκότων, καὶ προσλαμβάνοντες ὡς αὐτως ἔχον πρὶν γινόμενον οὕτως ἰδεῖν." (*De Gen. Anim.* IV. I.) "Croire tout ce qu'on rêve," if useful and possibly admirable in its day, in "neo-Hegelians" is a little stale.

(σπερματικὸς λόγος) : not perceiving indeed that the content of notions is, as Abélard had pointed out plainly, in inverse proportion to their universality. Like Sidney's hooded dove, the blinder they were the higher they strove¹. For example : from a lump of silver a medal is struck ; from many lumps of silver many medals are struck, each different from the other : let us eliminate as accidents the notions of silver, of the blow of a hammer, even of particular features of the devices, and we shall reach the idea of an agent with a type or seal, or of such an agent with many seals, or ideas, who may thus individualise indifferent matter ; or, to penetrate deeper into abstraction, who may transfer forms of his own activity to motionless

¹ Thus, in ascending from general to more general, in the most general will be sought unique and perfect being ; the primary cause and sole object of science—the *αὐτοζῶον* of the Alexandrians : whereas by successive eliminations utter abstractions would become utter vacuity. To such realists all subordinate beings are integral parts of the primary being. It would serve no useful end here to analyse these doctrines, or to indicate the pythagorean or stoical elements of them ; for platonists and realists had their schools and degrees of subtlety ; and Plato himself was inconsistent. Some brought secondary agents—demiurges or angels—into more creative activity, others carried creative reason back to the ideal good, and so on.

stuff. It is my part to-day to show that before motionless stuff—before the problem of the “*primum mobile*”—even Harvey himself stood helpless ; helpless yet fascinated by the indulgence of invention when, in the *De motu cordis*, or the *De generatione*, he permitted himself to carry contemplation beyond the sphere of his admirable experiments. “Natural, vital and animal spirits” indeed he would have none of ; saying well that he should want as many spirits as functions, and that to introduce such agents as artificers of tissues is to go beyond experience : yet in his need of a motor for his machine he was not able to divest himself of the language nor even of the philosophy of his day ; he referred the cause of the motion of the blood, and therefore of the heart, to innate heat¹. In his day he could not but regard rest and

¹ Held by Gilbert, and attributed to Averroes ; but older than Averroes. In turning to Francis Bacon’s hypothesis I read (Ed. E. and S. II. 263. Hist. Densi et rari—chapter, “*Dilatationes per spiritum innatum se expandentem*,” a Paracelsian sort of chapter) “*Pulsus cordis et arteriarum in animalibus fit per irrequietam dilatationem spirituum, et receptum ipsorum, per vices*.” The muscular quality of the heart was known to Galen, forgotten, and rediscovered. *Spiritus vitalis*, for Bacon, was “*aura composita ex flamma et aere*” (cf. *Æn.* VI. 747). Glisson has been fortunate in two generous judges, in Haller

motion as different things ; and motion as a super-added quality. In denying the older opinion¹ that the heart is the source of motion, of perfection² and of heat, he put the difficulty but one stage back ; and, when in the treatise on Generation he propounded his transcendental notion of the impreg-

and Virchow ; it would ill become me to depreciate a distinguished Fellow of my own College, and as a clinical observer Glisson had considerable merits ; but as a physiologist he was sunk in realism. He was happy in the invention of the technical term "irritability," but for him this virtue was as metaphysical an essence as the vital spirit ; his prime motor was not physical. As a philosopher I fear the independent reader of his works will find him fanciful and wearisome.

¹ Herein Harvey's sagacity brought him towards the truth. "Air," he says in the *De generatione*, "is given neither for the cooling nor the nutrition of animals.....it is as if heat were rather enkindled within the foetus (at birth) than repressed by the influence of the air." Boyle (who says that he worked under the influence of Harvey's discoveries) carried this matter forward by most interesting and sagacious experiments with his air-pump. For the layman, I may add that (to speak generally) before Harvey's time respiration was regarded not as a means of combustion but of refrigeration. How man became such a fiery dragon was the puzzle !

² Perfection was attributed, not only by medieval philosophers but also by Plato and Aristotle, to the circle. Circular movement was therefore the most perfect, and therefore again must be that of the planets. This is a good illustration of the almost necessary tendency in the earlier excursions of thought to equate incoordinates, and to fill gaps in reasoning from alien sources.

nation of the female by the conception of a "general immaterial idea," we find in him realism still very much alive indeed. Had Harvey been content with innate heat he would have done well enough ; but the innate heat of the blood, as he explains it, is not fire nor derived from fire ; nor is the blood occupied by a spirit, but is a spirit : it is also "celestial in nature, the soul, that which answers to the essence of the stars.....is something analogous to heaven, the instrument of heaven."

In denying that a spirit descends and stows itself in the body, as "an extraneous inmate," Harvey advances beyond Cremoninus, who then taught in the chair of Averroistic philosophy in Padua ; for, says Harvey, I cannot discover this spirit with my senses, nor any seat of it. In another passage indeed Harvey warns us "not to derive from the stars what is in truth produced at home"; in yet another he tells us that philosophers produce principles as indifferent poets thrust gods upon the stage, to unravel plots and to bring about catastrophes: yet he concludes that "the spirit in the blood acting superiorly to the powers of the elements,.....the soul in this spirit and blood, is identical with the essence of the stars."

Thus the riddle which oppressed these great thinkers, from the Ionians to Lavoisier, was in part the nature of the “impetum faciens¹”—of the *Bildungstrieb*. What makes the ball to roll? Does heart move blood or blood move heart; and in either case what builds the organ and what bestows and perpetuates the motion? Albert of Cologne, and at times even Aristotle, as we have seen, were apt to leave moving things for abstract motion, and to regard formulas as agents. Telesius again, the first of the brilliant band of natural philosophers in Italy of the xvth and xvith centuries, was still seeking this principle of nature in the “form” of the peripatetics. Gilbert regarded his magnetic force as “of the nature of soul, sur-

¹ Not only movement but also formative activity. The *ἀρχὴ τῆς κινήσεως* is the efficient cause of Aristotle; for him final causes direct motion—the *οὐ ἕνεκα*. Thus dialectic was taken for dynamics. Even Kant confused cause and effect with reason and consequence in hypothetical propositions (Benn). Caverni (*Storia del methodo sperimentale in Italia*, 1891—5) says that Jordanus Nemorarius (of Borgentreich near Warburg, d. 1236) made the great advance of extending the static physics of the ancients to establish dynamics; and that he introduced the word “moment.” In a cursory survey of the two works of Nemorarius which we have in Cambridge I have not been able to verify this statement; the notion I have found but not the word itself.

passing the soul of man." Galileo, although willing to conceive circular motion as perpetual¹, and even self-existent, was unable thus to conceive rectilinear motion.

Harvey, then, and other naturalists of the time, including Cæsalpinus and after a fashion even Descartes, followed the medieval world and Aristotle in deriving the source of motion directly from the spheres. Harvey says with Dante, "Questi nei cuor mortali è permotore." The attraction exercised by external supreme mind (not associated with matter) and its thoughts bring the material cosmos and its parts into regular movements. The so-called *Αἰθήρ*, or fifth element, "*στοιχείον ἕτερον τῶν τεσσάρων, ἀκήρατόν τε καὶ θεῖον*" (De Cælo, cap. 2 and vid. Zeller II. ii. 437), under the name of the Quintessence, played a large part in the speculations of Lulli, Paracelsus and other chemical mystics. Till Copernicus transfigured the cosmos, and Galileo and Newton carried terrestrial physics into the celestial world, the heavenly bodies were regarded as animated beings, themselves set in motion by spheres, and, by propagation of their intense activity from sphere to sphere,

¹ Vid. p. 44, note 2.

animating all sublunary matter, wheels within wheels, even to its innermost particles. Aristotle's view (Metaph. XI.) was as follows:—The stars and planets are in their nature eternal essences; that which moves them must itself be eternal, and prior and external to that which it causes to be moved; likewise that which is prior to essence must itself be essence; and so on for a hierarchy of eternal essences: thus Heaven if not God is a divine embodiment (*θεῖον σῶμα*); and this *πρώτον τῶν σωμάτων* he regarded as the essence of heaven and stars, and the cause of animal heat in living beings. Thus the transition from Aristotle to the later conception of the celestial bodies as themselves animated beings was easy; indeed the attribution of intelligence to the spheres goes back at any rate to Plato (Timæus), if not to Pythagoras; and was the foundation of astrology. In Harvey's time there was still in Rome a basilica of the Seven Angels (the planetary essences). Much of this doctrine Harvey probably got from Cicero (Acad. I. ii. 39 and De Fin. IV. 5—12; vid. Krische), who speaks of "ardor cœli" as the whole astral sphere. If I am not mistaken Harvey somewhere advises Aubrey to study Cicero.

Matthew Arnold thus regrets the old illusion :—

And you, ye stars !
 You too once lived—
 You too moved joyfully
 Among august companions
 In an older world, peopled by Gods,
 In a mightier order,
 The radiant, rejoicing, intelligent Sons of Heaven !
 But now you kindle
 Your lonely, cold shining lights,
 Unwilling lingerers
 In the heavenly wilderness,
 For a younger, ignoble world.
 And renew by necessity,
 Night after night your courses,
 Above a race you know not,
 Uncaring and undelighted¹.

Of the origin of energy we have not solved the
 riddle, we have given it up ; but instead of coming

¹ And Goethe :

“Wie Himmelskräfte auf und nieder steigen
 Und sich die goldnen Eimer reichen !
 Mit segenduftenden Schwingen
 Vom Himmel durch die Erde dringen,
 Harmonisch all das All durchklingen.” Faust I. i. 1.

In many of the older poets the same motive is found.
 Vaughan, a contemporary of Harvey, says :

“And round beneath it Time in heures, dayes, yeares,
 Driven by the spheres
 Like a vast shadow moved.”

The only celestial messenger who has discussed this matter
 with mankind was something of an obscurantist. Vid. Para-
 dise Lost, Bk. VIII.

from without we know that it comes from within. As Mr Benn puts it, we have extended the atomistic method from "matter" to motion. Harvey's contemporary, Francis Bacon, sagaciously guessed that heat is an expansive motion of particles ; but he regarded heat and cold as two contrary principles. Almost in the same generation the brilliant John Mayow perceived a substance in the air "allied to saltpetre," which passed in and out of the blood by the way of the lungs or placenta. "Innate heat" then gave way to phlogiston ; but it was not till the discovery of oxygen and of the conservation of energy that we attained a theory of energy, and finally got rid of "matter and form," and of all the thicket of metaphysics, relating thereto ; through which in the day of Harvey no mind, however mighty, could have made its way.

In the history of medieval thought we must always bear in mind that in neither of its two periods were theology, logic, metaphysics, psychology, or even physics, fully differentiated ; and before the Arabian literature they were not differentiated at all¹. Logic, which for us is but a drill, and, like all

¹ The word "philosophy" in the Middle Ages signified the pursuit of knowledge of things human and divine, and of the causes of them. It was often divided into Physics, Ethics and

drills, a little out of fashion, was for the Middle Ages a means of discovery, nay, the very source of truth ; thus every man carried his own busy laboratory within him. The heirs of Porphyry and Boetius had no other method in their possession. The dialectically irresistible was the true (*κατάληψις*) ; thus was man to succeed "irrefutabile aperire secretum." To begin to think before beginning to learn is a hollow business, yet then logic furnished the theorems which experience might illustrate at its leisure ; and nature was contemplated under philosophy. The differentiation of psychology began with the translation of the *De anima*¹, and the recognition of the relation of the percipient ; hence, in the second period, Roger Bacon denounced the pretensions of logic, and John Duns, that brilliant backslider, forced them to an absurdity. Again, on the translation of the Metaphysics, theology parted into the studies of the doctrines of God and the soul, which belong to theology proper, and of being, in modes, kinds and

Logic. Cicero, to some of whose writings I have referred as then popular, says (in many passages, e.g. in the Acad. I. and II.) that philosophy "Prima rerum naturam scrutatur, secunda animum componit, tertia bene disserendi rationem docet."

¹ Vid. note, p. 77.

universals, which belong to metaphysics. Medicine again was a confusion of spheres, as was theology ; the care of the soul and the care of the body were the ends of knowledge, and their means contained all knowledge. Thus when we hear that Alcuin ordered the formal teaching of medicine, it was under the name of "Physica" ; and not until the Physics of Aristotle came to light did the various branches of natural history become in their turn not only definite studies but also self-sufficient, aside from the art of healing. To this day the healer keeps the name of "physician" ; and the subject at Cambridge the name of Physic. It is well to be reminded that although the soldiers of truth must be separated into several regiments, nevertheless for its edification the healing art must draw, directly or indirectly, on all natural science. Robert of Lincoln, Albert of Cologne, and all the Masters of that time studied medicine—that is τὰ φυσικά—as a solid part of knowledge, which in their apprehension was not only a whole but also a manageable whole. Even Francis Bacon did not realise fully the littleness of man in the presence of nature ; he hoped that for his harvest man would on a right method—by, let us say, a reformed astrology and a reformed alchemy—

quickly surprise the secret of her processes : thus Bacon was the last of the Summists. With the differentiation of the several spheres of knowledge, and the perception of the vastness and variety of each, man has ceased to hold not the unity but the simplicity of nature ; and he has given up summaries : the theologian rules no longer in metaphysics and psychology ; the physician is no longer the only naturalist.

Systems succeed each other but give each other the hand ; it takes many a generation to kill a strong theory outright : realism, shaken by Roscellinus and Abélard, and scotched by Hales and Ockham, survived to mislead Harvey ; and still it stretches its withered hand over us in the nursery, in the school, and in the great arguments of life¹. Malebranche

¹ The judicious reader will remember in the Letters to Martinus Scriblerus the "familiar instance" of the jack. "In every roasting jack there is a meatroasting quality which neither resides in the fly, nor in the weight, nor in any particular wheel of the jack...but is inherent in the jack....As sensation, reasoning, volition &c. are the several modes of thinking, so roasting of beef, roasting of mutton, roasting of pullets, geese, turkeys &c. are the several modes of meat-roasting....And as the general quality of meatroasting, with its several modifications as to beef, mutton, pullets &c. does not inhere in any part of the jack, so neither does consciousness" &c. &c.

warned us against our deceptive terminology. "Ils prétendent expliquer, (he says), la nature par leurs idées générales et abstraites, comme si la nature était abstraite." The methods of the English grammar schools are even now medieval in so far as their teaching begins, as it mostly does still, with abstract propositions.

Mysticism gathered over Germany; in Paris to this day nature is constrained in the artifices of logic and rhetoric; and to this day platonism, chiefly by the influence of the Florentine humanists and perhaps of the Cambridge school of Henry More, has moulded both thought and language in England. John Hunter conceived a "*materia vitæ diffusa*"; and but yesterday Huxley had to say of Owen's theory of "spermatic force" that an artillerist might as well attribute the propulsion of a bullet to "trigger force." We profess Aristotle, and we talk Plato. Even by men of science it is daily forgotten that the only being is the particular. After the Faith then, realism—the belief in principles and kinds having external existence, and in formative essences to be reached by abstract thinking—stood another adversary against natural knowledge.

But, stronger even than realism, was a third adversity—the pride of the human mind. Socrates, although, for ethics and politics, he initiated the inductive method, was disposed to regard physical speculations as but a rational pastime¹, and the political and ethical study of man as the only serious engagement of thought. Aristotle took up natural knowledge as an encyclopedist²; he rarely verified his facts and he made no experimental researches³. The medieval church held that “*ex puris naturalibus cognoscere*” was a

¹ Or indeed he shrank from them, as the continual exclusion of divine interference seemed to him a starvation of moral growth. Vid. Phædo, 96, the interesting passage beginning “*ἐγὼ γὰρ νέος ὢν θαυμαστῶς ὡς ἐπεθύμησα ταύτης τῆς σοφίας ἣν δὴ καλοῦσι περὶ φύσεως ἱστορίαν κ.τ.λ.*”

² The encyclopedic method, followed by Francis Bacon, and perpetuated even in the nineteenth century by some German metaphysicians, was not the mere collection of matter from any or all quarters, after the manner of Pliny; nor again mere omniscience; but was the demonstration of a cosmical theory from all departments of knowledge. When knowledge was a theological philosophy theologians were bound to supply thinking men with “*Summæ*,” or comprehensive applications and casuistries of it. Hugo of St Victor (d. 1141) and Robert Pullen (d. 1150) were the first scholastic Summists.

³ Aristotle made many experiments, but experiments are not necessarily verification; and for the most part his were not. It is not experiment which makes science but the experimental method. Dr Payne, in the Harveian Oration of 1896, reminded us that among the ancients the forerunner of Harvey in this method was Galen.

meagre and might be a mischievous amusement ; and it sought to confine speculations to final causes, that is to the animation of the world by an intelligent Being, as man animates his own instruments : though, as Roger Bacon declared, final causes must have physical means. Even Locke thought nature to be hopelessly complex, and urged that ethics is the proper study of man. The asceticism derived from the East, disdainful of carnal things, brought the dualism of matter and spirit into monstrous eminence ; and, in respect of medicine, in a few generations it turned the cleanest people in the world into the most filthy¹. Moreover, are we not bound to admit that, as ultimate analysis was dangerous to the synthesis of the Faith, so for unwieldy and unstable societies in which ethical and political habits had not yet become engrained, to descend from transcendental explanations to explanations by lower categories was fraught with some danger to lofty and imposing standards of custom and conduct ? Nature is too base, says St Anselm,

¹ Those who are curious in manners will observe that during the last few years the medievalising clergy in England have discarded that fair linen which in the elder clergy was the emblem and the example of cleanliness.

for us to argue from it to God; we must argue from God to things. Analysis is a disintegrating function; the departure of the scientific enquirer is rather from below upwards: it is not only his bias but also his deliberate method to decline to use the discipline and the conceptions of higher categories until he is satisfied that those of the lower are inadequate. A certain natural process may not be attributed to those of chemistry until those of physics are proved to be inadequate; to another process biological conceptions and methods are denied until those of physics first, and then of chemistry, have been tried and found wanting; psychological conceptions are denied to another until in their turns the physical, the chemical, and the physiological are exhausted¹; and so on: and within each category the same economy prevails. Now this scientific economy, perhaps first formulated, or effectively used, by William Ockham, in the phrase "*entia non sunt multiplicanda*"—known as "Ockham's razor"—is what is called now-a-days "materialism"; and there is no doubt that the method, legitimate, nay,

¹ "*Nemo psychologus nisi prius physiologus*," said Johannes Müller.

imperative, as it is in natural science, may in custom and conduct engender a personal and collective habit of apprehending in lower categories, and even of contentment in them until strong reason be shown to go higher¹. A higher order of ideas is put in a lower order of language ; the "*ὁδὸς εἰς τὸ κάτω*" of Heraclitus. The danger of this attitude lies in loss of effort, of aspiration, and even of imagination ; he must stoop on the weary oar who, knowing no anchorage, is ever stemming the drift. Notwithstanding is there in history any lesson sadder than this, that where ideals have been loftiest sin and failure have most abounded ? a lesson from which Carlyle learned that "the ideal has always to grow in the real, and often to seek out its bed and board there in a very sorry way."

Almost to this day then the mechanical arts, presumably concerned rather with the lower categories, have been regarded as base ; and the craft even of the laboratory as unworthy of great souls. Anatomy had to labour against antipathy both ecclesiastical and popular ; chemistry and mechanics were

¹ For example, one man, fixing his eyes on a sublime ideal of holiness, confesses on his knees that he is a miserable sinner ; another, surveying men about him, repudiates this imputation : it is a matter of parallax.

gross pursuits, unless endowed with the perilous distinctions of alchemy and sorcery. Unfortunately this charge upon the dignity of man was made heavier rather than lighter by Petrarch, and by the later humanists of the Renaissance ; even in the 17th century we find in Oxford that Boyle was bantered by his friends as one "given up to base and mechanical pursuits." As Boyle himself put it in his delightful way—"There are many Learned Men.....who are apt to repine when they see any Person capable of succeeding in the Study of solid Philosophy, addicting himself to an Art (Chemistry) they judge so much below a Philosopher, and so unserviceable to him. Nay, there are some that are troubled when they see a Man acquainted with other Learning countenance by his example sooty Empiricks"....."whose Experiments may indeed be useful to Apothecaries, and perhaps to Physicians, but are useless to a Philosopher that aims at curing no Disease but that of Ignorance."

¹ Boyle, *Essays*, 2nd Ed. 1669, p. 119. In his Edition of 1661 Boyle speaks of the discovery of Harvey "our English Democritus" (published 1628) as commonly accepted. Whereby, he says, other "very plausible and radicated opinions" (the old schemes of the circulation)... "are generally grown out of request."

Lord Herbert of Cherbury, who early in the seventeenth century attended lectures at Padua, opined that natural science deals with "ignoble studies, not proportioned to the dignity of our Souls." In the eighteenth century indeed, grave English physicians, humanists who forgot how Aristotle had exclaimed that marvellousness lies in all natural phenomena, scorned the trivial curiosity of John Hunter respecting flies and tadpoles.

It is part of my argument to-day to point out one evil of many which this prejudice has wrought for medicine. The progress of an applied science dependent as it is upon accessions of advantage from other arts, yet on the whole is from the simple to the complex ; from facts of more direct observation to those of longer inference : and this path was the more necessary when the right method of inference—the so-called inductive method—had not been formulated, and indeed was barely in use. Now in medicine, from Homer to Lord Lister, direct observation and the simpler means of experiment have obtained their first-fruits on the surface of the body. In Homeric times surgery was the institution of medicine, and kings con-

cerned themselves with the practice of it. From Erasistratus to Celsus physicians of all schools practised medicine and surgery as one art. Galen urges the unity of medicine, and Littré points out that this unity is maintained in the Hippocratic writings. In the Middle Ages the ascetic contempt for the body—partly Stoic, chiefly oriental,—the barren alliance of medicine with philosophy, and the low esteem of mechanical callings hid from the physician the very gates of the city into which he would enter. Francis Bacon says of the physicians of Harvey's day, that they saw things from afar off, as if from a high tower ; and, again, that after the manner of spiders they spun webs of sophistical speculation from their own bowels. Surgery, by virtue of its imperative methods, was kept clear of philosophy on the one hand and of humanism on the other ; and in Paris the establishment of the Collège de St Côme, afterwards the Academy of Surgery, protected the higher surgery against the rabble of barbers. Upon the raft of anatomy and surgery, with some clinical aid from Salerno, positive medicine crossed the gulf between Byzantine compilations, monkish leechcraft, Arab starcraft

and alchemy, and the scientific era of Harvey¹. But physicians were not only blind to the great services to the whole art of medicine of the surgical school of Lanfranc in the fourteenth century, of Guy de Chauliac in the fifteenth, and of Paré and Gale in the sixteenth century, advances even accelerated in the seventeenth, but they ignored also their very origin, and even withdrew from fellowship with the surgeon ; to our grievous harm from those days unto our own². Surgery was excluded from the Faculty of Medicine of the University of

¹ Haeser says (vol. II. p. 433) : " Einen sehr bedeutenden Aufschwung nahm die Chirurgie im Zeitalter Harvey's bei den Engländern, unter denen bis dahin kein Wundarzt ersten Ranges aufgetreten war. Nach kurzer Zeit erlangten die englischen Chirurgen durch allgemeine Bildung, gründliche Kenntniss der Anatomie, und praktische Gelegenheit ein entschiedenes Uebergewicht über die bis dahin herrschende französische Schule." Cf. also Daremberg, Hist. et Doct. vol. I. p. 281 et seq.

² In the Medical Magazine (May, June, July, August, and Sept. 1899) is an interesting essay by Mr D'Arcy Power, " How Surgery became a profession in London." Mr Power tells us that a scheme for the unity of the medical profession in London was set on foot in 1423, when the surgeons were the more highly organised body. A " Rector of Medicine " was indeed elected (Master Gilbert Kymer). It is not known how long the conjoint faculty of medicine and surgery lasted in London ; but unhappily for our profession it seems to have been dissolved in a very few years.

Paris ; and from the Royal College of Physicians of England, which was, and is still, enabled by charter to teach surgery, and to grant licenses therein. Fabricius, the master of Harvey, was fortunately as great a surgeon as anatomist, and such was Fallopius. In this College Harvey lectured on anatomy and surgery, and he left his surgical instruments to us ; for us Caldwal founded a lectureship in surgery which has been allowed virtually to lapse. From the progress of anatomy which, under the protection of the Italian nobles as formerly of the Alexandrian, went hand in hand with surgery, physicians drew then little advantage ; and so in part perhaps it came about that although Vesalius, Fallopius, and Fabricius broke up the traditional anatomy of Mundinus, yet anatomy did more even for the fine arts than for physiology ; and medicine at the end of the Middle Ages had not recovered the standard of Alexandria. Against this adversity also had to contend the founder of physiology whom to-day we celebrate.

Such were the chief adversities (vid. Appendix on Astrology) under which the naturalist suffered, but natural knowledge was never stifled ; let us now turn our eyes to another point of view, from

the oppression to the gradual enfranchisement of knowledge.

Necessary for the welding of western society in the Middle Ages as was authority in all spheres of thought and action, and, heavy as the price of its inertia has been since its work was done, yet in the celebration of the founders of natural science it would be untrue to assume that before them, even in the earlier scholastic period, the indomitable spirit of man had lain under tyranny in silence. "*Μένει τὸ θεῖον δουλίᾳ περ ἐν φρενί.*" The way had been prepared for them. By the Crusades of the twelfth and thirteenth centuries fury and devastation were diverted in part from Europe, and hurled upon Asia ; which soon closes up again. The naïve serenity of the Faith was gone, but as its great minsters arose it forgot its dangers ; and the social bonds of orthodoxy rudely shaken were renewed. The Schools grew as great as the churches : Naples, Pavia, Bologna and Padua ; Paris, Orleans, Bourges, Toulouse, Montpellier, the Sorbonne ; Oxford and Cambridge. Even the Friars Preachers and Minors were driven to fight with the new weapons ; first rivalling the universities, then possessing themselves of their chairs.

But philosophy, which had lent much to the Faith¹, gained nothing from it; and to philosophy rather than to the Church the sciences looked for their principles and methods. In physics the experimental method was creeping into life; and the substance as well as the form of old controversies was changing. Thus through all these generations was rising a leaven of free thought, and its reforms may roughly be put in a twofold division, into the reform of tradition, and the reform of method; the reform of texts being again divisible into two periods—the Arabian, or second scholastic, and the modern or Renaissance period. The chief monuments of learning were stored in Byzantium² until Western Europe was fit to take care of them. In the peace of Theodoric, in the peace of Charlemagne, under Alfred at Winchester, the arts and

¹ This relation was somewhat one-sided: the philosophers forged doctrines and presented them to the Church; whereupon the Church consecrated them to eternity, and the philosophers were not allowed thereafter to improve or to restore their own creations. "*La théologie n'est quelque chose qu'à condition d'être tout.*"

² As Erigena and Rabanus knew some Greek, Ireland, like Edessa and Bagdad, seems to have shared the honour of preserving original texts; we may infer from the doctrines of Erigena that in Ireland the *Timæus* was the chief of them.

sciences had scarcely found breathing-time, and no sure establishment¹. Cassiodorus is said to have directed the Benedictines of the sixth century to read Cælius Aurelianus, a Roman adaptor of Soranus of Ephesus ; but medical lore consisted of little beyond some relics of the Roman schools, handed on in prose or verse compilations which the teacher read to his class, and explained so far as he could. It seems that medicine was not taught formally until so ordered, in 805, by Charlemagne ; probably by the advice of Alcuin, the founder of the learned tradition at Fulda, the founder, we may almost say, of the neo-latin period, and some time headmaster of my own school of St Peter at York. The influence of the School of Salerno, relatively excellent as it was in the domains

¹ See Baas, *Geschichtliche Entwicklung des ärztlichen Standes*, 1896, p. 128. Charlemagne journeyed in Italy where some schools still existed, and where Priscian, Donatus, Boëtius, Cassiodorus, Augustine, even Virgil and Cicero were read ; thence he called teachers to his palace schools ; and to Lyons, Orleans or Tours. How Paris became the centre of enlightenment in the Western world is not clear. The "palace school" probably was of no place, but of the royal retinue ; that the School of Paris was made up of those of St Geneviève, St Germain des Près and the Cathedral school seems not to be a very probable conjecture.

of clinical medicine and of public health, never made its way into the general stream of Western culture. Religious wars and persecutions had driven Greek learning eastwards, as in the case of the Nestorians from Antioch to Persia; Hebrew and Syrian sages¹ translated some classical texts, and

¹ The "Arabs" were a mixed throng of orientals; some of them were Aryans, as the Persians and Nestorians; some were Arabs, Syrians, or Hebrews. The Nestorians were eminent as physicians, and it is interesting to this College to know that one of the best translators of Aristotle into Arabic was Johannitius, a Nestorian physician. The Eastern peoples, as the Western, owed all to the Greeks except a double measure of dialectical ingenuity, which was their own, and is their own to-day. By the incisive methods of Aristotle the Christian neo-platonists had been variously carved into heretics—such as the Monophysites; and these when driven eastwards carried Greek to Edessa and Bagdad: from these centres it was, and from Nisibur in Persia and elsewhere, that the "Saracens" drew their culture. Aristotle was first translated into Arabic in the reign of Al Mansur, the son of Harûn al Raschid (813—833); Avicenna carried the Aristotelian encyclopedia to its culmination; and Cordova in the tenth century was as full of fervid disciples as was Paris in the thirteenth. The Arabian medicine was Aristotle and Galen. The Arabian philosophy was originally built upon the Alexandrian emanations and hypostases (the soul of the universe, intelligence the first of creatures, nature and mutability, and so forth). Essences and forms were produced, as the "intelligibilia" of "real" knowledge, till, as some one has wittily put it, "universals became almost palpable." Avicenna indeed approached understanding from the senses, and Averroes accepted this right position; but he taught the permanent subsistence of intelligence, as a sphere in a hierarchy of

from these again the Arabs, in their brief and brilliant culture, made translations ; for no Arab sage knew Greek. The palace of the Spanish Caliphs in the tenth century was a workshop of translators, and a huge storehouse of books. The learned and ubiquitous Jew carried texts and translations from Bagdad to Morocco, and from Morocco to Toledo, Paris, Oxford and Cologne ; but translations made in Bagdad in the ninth century did not reach Paris till the eleventh or twelfth.

Among the earliest of these renderings in the West were works on medicine, mathematics, and astronomy, which in the Schools of Toledo and Cordova, by Constantinus Africanus at Monte Cassino (including certain treatises of Hippocrates and Galen), by Gerard of Cremona (a Salernitan

spiritual principles independent of matter and persons. In no long time this was turned into the unity, as opposed to the individuality, of the soul ; the universal soul dipping as it were into the individual, and at his death returning into the universal ; a virtual denial of personal immortality. Hence the bitter defiance of Albert and St Thomas. The Averroistic doctrines were enthusiastically propagated on the other hand by that "malleus Ecclesiae Romanae" Frederick the Second (1212—1250). The Arabian science consisted in medicine, mathematics, astronomy, and alchemy. Averroes it was who first asserted the independence of the spheres of science and religion ; a division popular at the present day, and one which lent itself to many a convenient subterfuge, in Padua.

scholar), by Michael the wizard¹, and by other hands, were converted into Latin; and, thus doubly disguised, and half buried in glosses which not only overlaid the text ("oscura glossa dov' é piana la lettera") but often supplanted it, were received with pathetic eagerness by the ardent scholars of the West. Aristotle, for instance, was now taught in the schools of the West from a Latin translation of a Hebrew translation of an Arab commentary upon an Arab translation of a Syriac translation of the Greek text². Even in the sixteenth century medicine and anatomy were taught wholly from books; and teachers were forbidden to use other than prescribed books. Students began with the "Articella" of the Venetian physician Gregorio Volpi, a compendium of translations with wood-

¹ Dante, *Inf.* (xx. 115). Michael Scot translated Averroes from Arabian to Latin; also the *De celo* and *De anima* of Aristotle, which reached Roger Bacon about 1230. Thus we may regard Michael as the founder of Paduan Averroism. All persons who busied themselves with natural experiment in the Middle Ages were accused of magic; even Albert did not escape the suspicion or the credit of sorcery.

² Renan, *Averroès*. And to like effect M. Hauréau says, "Le péripatéticisme d'Averroès ne diffère pas moins de l'antique doctrine du Lycée que l'Alhambra du Parthenon"; and he compares "le péripatéticisme d'Albert et d'Aquinas" to the "monuments fiers et bizarres du Gothique du XIII^{ème} siècle."

cuts, published in 1491 ; they advanced to the Aphorisms, the Diet in Acute Diseases and the Prognostics of Hippocrates, overlaid with Syriac, Arabic and Spanish apparatus and glosses ; to the *Ars Parva* of Galen ; to the first and fifth Canons of Avicenna, with glosses ; to the ixth Book of Rhazes, Honein, Aegidius Corboliensis, and perhaps some of the translations of Constantinus Africanus¹ ;—this was the lore that ruled the medical schools even to the birth of Harvey. Disputations among the students were incessant, both “inter se” and “sub cathedrâ” ; but it is doubtful whether these did more than sharpen their dialectical wits. Botany, regarded by the galenists as the secret of the divine dispensary, was always more forward ; every medical school had its physic garden, professors carried their students abroad to gather herbs, and Herbals, Dispensatoriums and Kräuterbücher were much in

¹ I may venture to quote again the “locus classicus” :—

“ Wel knew he the olde Esculapius,
And Deiscorides, and eek Rufus,
Old Ypocras, Haly, and Galien ;
Serapion, Razis, and Avicen ;
Averrois, Damascien, and Constantyn ;
Bernard, and Gatesden, and Gilbertyn.”

Chaucer, C. T. Prol. 429—434 (Skeat's Ed.).

advance of the Bestiaries, mostly after Pliny's kind, the chief of which, largely an original work, was that of the well-known Conrad Gesner.

Some hundred years before the appearance of the Arabian Aristotle, which marked the second scholastic period, we have seen that the shadow of the Faith and the savagery of the peoples had not quelled such teachers as Roscellinus and Abélard, who fought for rationalism so sturdily as even then to threaten the ascendancy of realism and the persuasion of supple and plausible demagogues like Anselm of Laon—that “sterile tree” as Abélard called him,—and actually to determine the first period of the Middle Ages. Happily the Arabian scholastic philosophy took its root in Alexandria when neo-platonism had veered towards Aristotle¹, and it was more uniformly peripatetic than the earliest Christian Scholasticism. It is one of the notes of the greatness of Aristotle that, even thus garbled and glossed, his power made itself felt by the mouths of the great Franciscans Alexander Hales, Roger Bacon, and William Ockham. The Organon had been expounded in Paris in 1180, and about the same

¹ See pp. 24 and 28.

time Alexander Neckam cited the Posterior Analytics, the Topics and the *De anima*; but Hales was in possession of the whole, or almost the whole, of a more or less corrupt Aristotle, which he turned upon theology.

Roger Bacon was the first of the natural philosophers of the West, and the only eminent forerunner of Harvey and the other pioneers of natural science in the seventeenth century. As erudite as Albert, Bacon was more inventive, freer of spirit, more disposed to scientific method, better aware of the hollowness of authority, better aware that truth can be found only in free reason guided by experiment. Unfortunately as an author he was as dull and ineffectual as Francis Bacon was rich, animated and impressive. That indeed this premature renaissance, without scientific methods or sound tradition, should have failed¹, that its light was but the phantom of dawn², is no matter for surprise; yet from this time forward the

¹ As a school of thought; in fine art of course it was glorious.

² Ozanam (Doc. inédits, quoted by Rashdall, p. 78) says this early light was "une de ces nuits lumineuses où les dernières clartés du soir se prolongent jusqu'aux premières blancheurs du matin."

methods of Cyprian and Athanasius lost their undisputed sway. This earlier renascence made the second period of the Middle Ages: the period distinguished by the Arabian version of Aristotle; by a check to the chimeras of realism; by some liberty of secular knowledge, for even bishops came out of the Mussulman school of Toledo and arrayed themselves in vestments of Arab work decorated with sentences from the Koran; and again by the coming of the friars, the Dominican and Franciscan especially, whose influence upon the thought of the Middle Ages was considerable, and soon rivalled even that of the universities, wherein later, as we have seen, they filled some of the chairs.

The issues of all schemes of thought led indeed as inevitably to natural science, as all ways to Rome. The logic and rhetoric of the learned Dominicans—the watch-dogs (“Domine cani”) of the Lord against the wolves of heresy,—culminating in the systems of Albert and St Thomas, by their rationalism defined, and in defining restricted, the dominion of the Faith. Keen defenders of the Faith recognised this danger, and whimpered even against Albert that “*philosophiam profanam in limen*

Sanctæ Theologiæ intromiserit;...in ipsa sacraria Christi¹.” Men got used to reason, and great protestants, such as Robert of Lincoln, had put justice

¹ Albert—“*nostri temporis stupor et miraculum!*”—is an attractive figure, and deserves his renown as the greatest of the medieval sages. His endowments were richer and wider than those of the great Italian logician, his pupil, whose name has had a greater vogue, and whose doctrines are still the accepted discipline of the Church of Rome. Albert restored Aristotle, and in astronomy and chemistry sought for truth in nature. That St Thomas was a man of the highest intellectual power and attainments, an eminence which is claimed for him by many scholars, as by Mr Vernon in his edition of the *Paradise*, I cannot admit; unless it be to a critical scholar who has mastered the contents of his many folios, if such a scholar there be. For my part, after reading much of what is written of St Thomas, I have but done what was possible to me in other such cases; that is, I have run my eye over the titles of his books and chapters, and formed some rapid judgment here and there of the ways of his thought. Now I venture to assert that the ways of the thought of Aquinas, subtle and symmetrical as they are, lie wholly within the formulas of his age. He left science for logic, the stuff of thought for its instrument; satisfying himself with such tinkling cymbals as “*Nihil potest per se operari, nisi quod per se subsistit;...Impossibile est quod forma separetur a seipsa...quod subsistens per se desinat esse*”... and so forth. Albert though a less symmetrical is a more original genius. To Aquinas indeed I should hesitate to attribute genius; to Albert it seems to me this title may be granted, if with some hesitation. “*Vir famosus et erroneus*” was Roger Bacon’s summary of Albert’s career, but Bacon was scarcely an indifferent witness.

and honour before ecclesiastical politics¹. Then the few Greek texts found their way into the West, and in the thirteenth century Albert and Aquinas possessed themselves of Greco-latin translations of some treatises of Aristotle². And in the history

¹ Among the mss. in Corpus Christi College, Cambridge, are letters of Innocent IV. to the Archdeacon of Canterbury (and others), "Ut (Episc. Linc.) nepotem suum Fredericum (of Lavagna) in canonicatum in ecclesia Lincolnensi, proximè vacaturum, inducat, et Resp. Episc. Linc. in quâ probat talem provisionem esse contra voluntatem et cultus Dei; ideoque negat se concessurum." I see that the authenticity of some of these letters has been called in question by M. Charles Jourdain, but in any case they are contemporary, and consonant with Robert's acts and character. Moreover, two years before, Innocent had suspended the bishop for refusing to induct an Italian, ignorant of English, to a rich benefice in his diocese. I find that Dr Luard, in 1880, had no doubts of the authenticity of these letters (Encycl. Brit. xi. 211). Mons. Charles Jourdain's collected essays, in which he discusses their authenticity, were published posthumously in 1888; but his Editor makes the slovenly omission of the dates and places of the first publications of the several essays.

² There were three ways of access to the Greek texts of Aristotle: by the Arab-latin translations; by translations into Latin direct from the Greek; and by the use of the Greek text itself. These means were modified again by the chances of access to particular authors, and, as in the case of Aristotle for example, to particular treatises. To ascertain the dates of access to these new sources I have made some search; and herein I have found great help in the "Recherches critiques" of Amable Jourdain. We must remember that though the source of Western culture is not Latin, but Greek, yet its meagre channels in medieval Europe

of the comparatively unlearned Friars Minors we find, as elsewhere in the history of thought, that

were Latin; its best tradition lay in Lucretius, Cicero, Seneca, Virgil. The ill-starred Boetius was the last of the Grecians. Greek was driven East and West: West into Ireland, where in the ninth century a few Greek mss. survived, and were read in the original by Erigena and his disciples; but this Irish Greek tradition was soon lost, and there were no teachers of Greek. Yet it seems certain that, in Oxford, Robert of Lincoln and Adam Marsh had at any rate learned assistance in the production of some Greco-latin translations of Aristotle, of the *Ethics* for example. Dr Jackson has pointed out to me a passage in Aquinas' Commentary on the *Ethics*, where "the presentation of the right reading misspelt, and of a ludicrous etymology side by side with one which is very nearly right, seem to show that, whilst Aquinas had about him people who knew Greek, he himself had no substantial knowledge of it." Grosseteste himself may have had some efficient knowledge of Greek; "vir in latino et in greco peritissimus," says Matthew Paris. Dr Jackson (in a private letter) feels assured that "Roger Bacon was plainly a competent Greek scholar. Of this there is proof in the *Opera inedita*, edited by Brewer for the Master of the Rolls." We know also that more than one scholar of the 11—12th centuries travelled in the East, though, as Dr Daremberg says, travellers to the East were more apt to bring back false relics than genuine manuscripts. There was a small Greek community and a Greek monastery at Auriol, near the old colony of Marseilles. Still, for lack of masters and materials, Greek then was a very rare accomplishment; and it is manifest, from much internal evidence, that Albert had no Greek; though he certainly possessed Greco-latin translations of some few Aristotelian treatises by other hands, of the *De anima* and of the *Physics* for example, whence he makes quotations without interspersions of Arabic titles, proper names, nouns and terms, such as he rather helplessly reproduces in

mysticism was less unfavourable to natural science than the passionate dogmatism of Clairvaux, or the dogmatism by ratiocination of St Thomas; the Victorians, as Gerson after them, despised reason rather than feared it; they would not accept the services of philosophy even with its wings clipped.

"Cujus laus est ex ore infantum,
Hæc est sapientia"!

Mysticism makes for individual religion, as with Glisson and Newton, rather than for a Church,

his rendering of the ninth book of the *De cælo* and elsewhere. We know from other sources that a few treatises, such as the *De anima*, and the first two books of the *Ethics*, existed in Greco-latin rendering before the Arab-latin versions of Michael Scot and others (1220—1225). In later life Albert had the assistance of Aquinas to whom we have attributed some knowledge of Greek; for we find Aquinas, with the countenance of Urban the Fourth, not only searching Europe for Greek manuscripts, sending emissaries to Spain to make versions for him, and supervising the preparation of translations directly into Latin, but also personally comparing the Latin translations with the Greek texts of the *Ethics* and *Politics*, and recording variants; variants which Albert copied from his disciple. (It may be worthy of remark that even so late as 1586 there were no Greek types in Oxford, and that in 1599 Casaubon (*Life* by Pattison) could find no compositors for Greek in Lyons.) The great debt of the West to the Arabs was a new enthusiasm for learning, and for the "*Princeps philosophorum*"; not their travestied texts and unwieldy commentaries, which Roger Bacon, probably perceiving that his contemporaries swore by the Arab rather than by the Greek, wished he could burn.

as Albert was clear-sighted enough to foresee ; if science undermines dogma, mysticism relaxes or neglects it : hence, as clerks only could teach, it may have been that independent thinkers like Hales, Roger Bacon, and Ockham entered the Franciscan order¹. Indeed the science of Pietro di Abano

¹ To wonder why Roger Bacon became a clerk and a Franciscan is to look upon the thirteenth century with the eyes of the nineteenth. The vision of St Francis had not grown dim ; the strange beauty of his life held men captive still, and his cheerful natural religion still animated his disciples. None could have said more truly than St Francis

“ While others fish with craft for great opinion,
I with great truth catch mere simplicity.”

The grey friar of the fourteenth century, as we know him in Langland and Chaucer, or later in the degraded fanaticism of the Observants, had fallen far from the example of his master. Perhaps the chief reason for Bacon's decision was that his friend Grosseteste, who on the first coming of the friars wrote eloquently to Gregory the Ninth of their illumination, humility and piety, was a member of the Order, and was the first of its Rectors in Oxford. (Rd. Grosseteste, *Epist.* ed. Luard ; Rolls, 1861, p. 179.) Even in Cambridge, till 1877, teachers and professors, save those of Law or Medicine, were in orders, for the most part in holy orders ; for instance, the following extract, of date 1849, which I owe to the kindness of Dr Donald MacAlister, “ *Cæterum neminem in socium unquam admitti volumus qui non sit aut Theologiam professorus et sacros ordines post certum temporis intervallum inferius definiendum suscepturus aut e Collegio discessurus, nisi unus e duobus sociis qui Medicinæ aut ex illis duobus qui Juris Civilis studio deputati sunt, electus fuerit.*” (*Stat. Coll. Div. Joh. Evan. Cant. cap. xii. 28 April, 12 Vict. 1849.*) To this

(1250—1320), which laid the foundations of medicine at Padua, and inspired the frescoes of the Salla della Ragione, was occult and mystical.

hour in England the clergy command the public schools. In a warlike society learning and contemplation must fall to the clergy; without the fortresses of war or learning, if there was any safety, there was not dignity or peace. The mendicant orders were young institutions, ascendant, and in favour with the great. Of their usurpations in the universities I have spoken. Within them even Popes could not meddle, as Bacon found to his sorrow. Hales and Ockham also became Minors, as Albert and St Thomas, both of illustrious descent, became Preachers. Moreover the Franciscans had devoted themselves to the care of the sick, and especially of those smitten with the new pestilences—such as leprosy, syphilis, and plague—which Oriental dirt and asceticism had engendered or inflamed; and thus a bent to observation of natural phenomena may have been encouraged (see art. Roger Bacon, Westminster Rev. loc. cit.). To say that to the monks we owe the conservation of learning is not so true as to say that learned men betook themselves to the religious houses in order to find relief from turmoil, to secure the subsistence of life without its cares, to get access to books, and to profit by the counsel of comrades who had enjoyed not only the culture of their own house, but also the interchange of ideas and manuscripts with all the learned houses in Europe. When these advantages were to be had in the world, learning deserted the monasteries. Again, Bacon was not an unbeliever, nor anything like it; in the *Opus Majus* he declares the Holy Scriptures to be the source of all truth; not only, like Socrates before him and Kant after him, did he fix his eyes on moral perfection as the end, but also on the Church as the means: on the other hand the resentments of passionate genius under harsh duress did not make a naturally rebellious temper more tractable. “Fames et morabilem conciant.” It is evident that within the Franciscan

In the thirteenth century then the conflict with the provisional synthesis of the Faith had become imminent and menacing. The faith, the chivalry and the learning of the Saracens led men to feel that without the Church all might not be utter darkness. Albert owed as much to Avicenna—

order there were three well-marked parties ; namely, of the naturalists, as Bacon ; of the mystics, as Bonaventura ; and of the sophists, as John Duns the Northumbrian. Now Bacon's troubles did not begin till the succession to the Generalship of the Order of the seraphic Bonaventura, an argumentative mystic (like Duns, and unlike the ecstatic mystics of St Victor), who, rejecting Aristotle, had steeped himself in the neo-platonism of Augustine and " Dionysius the Areopagite " ; and Bonaventura and his party it was who stopped Bacon's mouth at Oxford, and shut him up in Paris. What the life of Bacon and the direction of medieval thought might have been had Grosseteste been able to spare Adam Marsh from Oxford for the Generalship it were perhaps too curious to consider ; yet we may profitably remember that Bacon, brushing aside Porphyry and his questions, and denouncing the " vain physics " of Paris, urged that enquiry should begin with the simplest objects of research, and rise gradually to the higher and higher ; every observation being controlled by experiment. He says indeed that by experiment only can we distinguish a sophism from a demonstration. (Op. Tert. xix.) Earnestly he tried to follow this method ; he seems to have spent on it substance of his own, and, after this was exhausted, to have appeared for the first time in history as a petitioner for " scientific grants in aid." Diderot speaks of Bacon as " Un des génies les plus surprenants que la nature ait produits, et un des hommes les plus malheureux " ; he lived in vain, died unhonoured, and left no disciple.

"the Albert of the Orient"—as St Thomas to Averroes ; pagan sages technically damnable yet "mighty spirits," worthy of reverence. Dante put in Hell, but on green meadows in an open place, lofty and luminous,—esteeming himself exalted by the sight of them,—not only Aristotle, Plato and Socrates, but also

"Euclide geometra, e Tolommeo,
Ippocrate, Avicenna, e Galieno,
Averrois, che il gran comento feo."

Inf. iv. 142.

Universities were founded in France, England, and Italy. Frederick the Second protected the Arabs, and even aped them ; Ghibeline indeed almost signified freethinker. From the Roman de Renard, from the candid Joinville, from Boccaccio, we may infer that the very foundations of the Faith were sapped ; and therewith, for good or ill, both moral and political bonds were loosened. But the natural science which made the second renaissance irresistible was absent in the first : the consolidation of the European peoples was not compact enough for a rehandling of the conceptions of religion and morals, too incomplete even for the latitude of opinion which, in nations as in individuals, is apt to slacken swift and consentient

action. The toleration and scepticism of the first renaissance had causes no deeper than a general enlargement of experience and thought.

To appreciate the influence, covert or overt, of scepticism in the Middle Ages we must clear the meaning of the word. Under the yoke of tribal custom scepticism can hardly arise, there is no place for the half-hearted, as all men feel alike so all think alike: scepticism arises when beliefs are put into formal propositions. Then, as experience and comparison enlarge, we detect scepticism in three forms or degrees: namely, doubt of a particular creed; doubt of all unverified propositions; and doubt of the validity of reason itself, whether in respect of the supernatural only or of all argument. It is remarkable that this last, the most devastating of the forms of scepticism, has come from the ranks of the faithful (Pascal, Hamilton, Mansel), who in resentment of the attacks of reason have turned blindly to rend reason herself. No civil society has been without scepticism; even in ages of most prevalent faith some current of doubt has flowed under the surface. In the Ionian philosophy the place of scepticism was only restricted in so far as many aspects of the subject-matter were not before

those thinkers ; for instance no Greek philosopher would have separated faith from reason. In the well-known words of Hippocrates, "*οὐδέν ἕτερον ἑτέρου θεϊότερον οὐδὲ ἀνθρωπινώτερον, ἀλλὰ πάντα θεῖα.*" "The Greek boldly set up his academy by the side of the temple." Even Protagoras never taught the futility of all reason, nor even the inconstancy of sensation which indeed is doctrine rather than scepticism. Neo-platonism had its scepticism in the first two forms, covering even the ground of the modern agnostic. Agnosticism does not deny the existence of the ladder, but asserts that the ladder begins and ends in the clouds ; it is consistent therefore with ethical and practical activity. When Abélard said "*Dubitando enim ad inquisitionem venimus, inquirendo veritatem percipimus,*" if a sceptic, he was no infidel. Even in the thirteenth century it was never doubted that truth is attainable, nor indeed that the Faith contained the truth. The scepticism of that age was rather cautious and controversial than faithless, and in practice divine discontent rather than indifference (*ἀταραξία*). Pyrrhonism on the other hand leads to slackness of ethics ; either to the insouciance of Horace and Montaigne, or to the attitude of the seventeenth

century in Padua (Pomponatius) and elsewhere, when the "economy," ironic or disingenuous, of allotting their several spheres to reason and dogma, if not first invented, became as fashionable as in the pulpits and in the drawing-rooms of Mayfair. "Comme savant j'ignore tout ; comme citoyen je crois tout." The *Hypotyposes Pyrrhoniæ* of Sextus Empiricus, whose influence in the times of the Renaissance was considerable, was not translated till the fourteenth century. The detachment of mind and shrewd wisdom of John of Salisbury foreshadowed Petrarch rather than Hume ; and when John discusses what it is given to man to know, asking the frequent question, "Utrum contingat homini scire aliquid ? ", we must not fall into the error of importing into his question all it connotes for ourselves. Likewise when James of Douay (in MS. *De anima*, quoted by Hauréau) roundly says, "Id quod recipitur ab aliquo non recipitur secundum naturam rei receptæ sed secundum naturam recipientis...sicut recipitur ita patitur. ...Sensus judicando de sua passione non decipitur" and so on, he knew no more whither this would lead than John Duns knew that his system must lead to that of Spinoza. That guardians of morals and

social cohesion, from Cato to the Westminster Assembly, and from Samuel Johnson to Cardinal Newman, should have distrusted scepticism even as reserve of judgment, or indeed repelled it with fierceness ; that priest, presbyter, magistrate and moralist have tolerated irony, or even license, rather than vigilant and radical criticism of doctrine, is intelligible ; and within limits springs from a justifiable apprehension. For the gay and indolent sceptic veers to conformity, especially if he mistrust the competence of reason ; while the active sceptic endangers the theory of his society, and of the sanctions upon which all moral conduct temporarily depends. Hence the bitter condemnation of Galileo, "Perish all physical science rather than one article of the Faith be lost." Happily it is true that during times of transition piety and good conduct survive by virtue of "inertia," that is by tradition, social pressure, custom and sense of fitness ; and it is true that in times of transition, as in our own times, halting thought is quickened for a while by plenitude of emotion, and wealth of æsthetic impressions makes amends for poverty of ideas ; yet that morals are based on a theory of life is a truth still deeper and more abiding, and this deeper

truth it was the function of the "Ages of Faith" to root in the conscience of mankind. "Abeunt studia in mores." As contrasted with Pyrrhonism, scepticism in its normal sense, while it declares that the conformity of notions with things in themselves cannot be postulated, for lack of an external standpoint of comparison, and while it declines to be confuted by the "regressus ad infinitum," for, having repudiated first principles it is prepared to be pushed backwards to remoter and remoter causes, is ready nevertheless to yield to assurance as facts are intercalated into inferences, and as inferences thus stiffened by verification are found to consist with each other and with the general context of experience.

If in the Middle Ages these various attitudes of mind were not fully distinguished, yet scepticism was moving variably towards the demand for verification on which all natural science is based; and the reaction was not long delayed. In the thirteenth century the culture of Omeiad and Abasid caliphs failed; by the end of the century philosophy was denounced and its books were burned; the generous and learned Frederick dashed himself in vain against the Papacy; Clement, the protector of

Bacon, was dead, and during the two following centuries, in Spain at any rate, freedom of thought was crushed out by the Church. In the fourteenth and fifteenth centuries the very name of Averroes—of “the mad dog who barked against the Christ,” the “Averroem impium καὶ τρὶς κατάρατον” of Erasmus—began to signify loose life as well as free thought. Of this resentment there had been no trace in Albert or St Thomas ; but Imola had begun to wonder why Dante had treated so well Averroes who, if the Great Commentator, was yet the father of infidels. The Dominicans controlled the fine arts, and for them,—at Pisa, at Siena, in the Spanish Chapel,—Orcagna, Gaddi, Spinello Aretino, Simone Memmi abased the Empire, Averroes, and the new learning far more intolerantly than Dante had done ; and exalted the Pope, with his hand-maids Theology, Grammar, Logic, and Rhetoric. In Santa Maria Novella, Memmi represents the triumph of the Dominicans in theology, Gaddi in philosophy ; St Thomas and the Dominicans march triumphant over Arius, Sabellius, Averroes, and Savonarola. Thus in the Middle Ages Averroes appeared in two forms—first as the Great Commentator, later as the blasphemer and father of

infidels of the Campo Santo and of Santa Maria Novella. In the fifteenth century the Council of Constance forbad the laity to teach, under a penalty of forty days' excommunication. In the sixteenth, in Granada, Ximenes burnt, it is said, 80,000 books of Arab philosophy, as Torquemada did for Hebrew in Seville ; medical works, however, such as the *Colliget*¹ of Averroes, and his Commentary on Galen, were spared.

With the greater renascence the second period of Scholasticism, and indeed the Middle Ages themselves are closed. With the fall of Constantinople the stream of learning, driven eastwards in the first period of the Middle Ages, set westward again. Exiled grammarians now found their shelter under the protection of the "literate tyrants" of Italy, and with their spoil of manuscripts enriched the libraries of Rome and Venice. The Universities of Bologna and Padua from their foundation became notable for independence of thought ; and, on the revival of learning, for their peripatetic

¹ "Colliget," Mr E. G. Browne tells me, is a corruption of *Kulliyyat*. It does not exactly mean "Summary" (as commonly stated) but rather "General Principles" (*Kull* means "the whole"; *Kulli* universal or general ; fem. pl. *Kulliyyat*). It may also mean collected writings (e.g. of a poet).

teaching as opposed to the platonism of Florence, where, however, a spirit of accurate learning was nurtured in the deciphering and verification of texts. The political and commercial ambition of Venice, the Holland of Italy, of which State Padua was the learned quarter, and the inflow of liberal thinkers from other nations, kept her aloof from the fury of the Catholic reaction of the sixteenth century, which ruined Paris; thus in North-east Italy the spirit of modern science awoke sooner than in England or in France, and inquisitive students, both home and foreign, were attracted rather to Padua and to Bologna than, as in earlier times, to Paris.

In so far as Scholasticism may be described as a temporary reconciliation of Aristotle—that is, of natural and secular methods—with the Faith, this end had been attained, if at all, by St Thomas; in St Thomas Scholasticism culminated. But no such artificial truce could abide; and the issue of the chief scholastic controversy was to be determined by one greater than St Thomas. The pilgrim to Ockham, sitting in its church beneath the seven lancets of its twelfth century window, may be solitary also in his memory of one of the greatest of Englishmen,

who saw that light six long centuries ago ; yet a child rather of our age than of his own. As Abélard had closed the gates upon the neo-platonist tradition of Alexandria, so Ockham closed them against realism in all its forms ; and the Church cursed them both. In his own person the occupation of professorial chairs by Franciscans came to an end ; Paris and the Thomists could not consistently oppose nominalism ; Duns the Northumbrian had inflated realism into a monstrous phantasm, and speculative reason had to submit to the yoke of verification. Yet what could nominalism do for theology, or for clerical schools ? The Franciscans for the most part had turned to mysticism, and thenceforth the man of science and the devotee were to work apart. Furthermore, by Ockham philosophy gained a new meaning, or lost all meaning. Before Locke, Voltaire, and Kant, Ockham demonstrated that faculties were not substances ; and differentiated logic, psychology, and natural science¹.

But if, as I have said, the way for Harvey and the other pioneers of natural knowledge was thus prepared for them, it was still, even in the seven-

¹ Vid. p. 50.

teenth century, dark, rough and perilous. As in all times of transition, still the weight of defunct systems rolled inertly along; and while the new forces seemed to slumber stresses were accumulating. In Oxford and Cambridge the influence of Linacre, and even of Caius¹, seems to have been rather humanist than scientific²; in Oxford the text rather than the inspiration of Aristotle prevailed, while in Cambridge the platonist school, of which the charming Henry More was the leader, full of inspiration as it was, soon evaporated into mysticism, or obscurantism. Bacon and Harvey seem to have left Cambridge—for Paris and Padua respectively—as Locke left Oxford³, under some discouragement. Of Paris the great days

¹ I venture to say "even of Caius," though Caius was a competent and indeed for his time an able clinical physician, as we observe in his work on the sweating sickness. (Vid. note, p. 96.)

² Oxford fell in the first instance under Franciscan influence, yet Alexander Hales (of this order) gave the peripatetic bent to Oxford which it retains to this day. Creed rather than conduct was the dominant note of the Faith (p. 85); it is interesting therefore to learn that for Oxford Robert of Lincoln and Adam Marsh translated, or procured a translation of, the Ethics. On the probability that Grosseteste had some substantial knowledge of Greek, see p. 75, note 2.

³ In Casaubon's diary we get a glimpse of Oxford in 1613. The University was wealthy enough; it had escaped the Paris

were over ; it was in Padua that medicine, long degraded or disguised, was now to prove her lineage as the mother of natural science, and the truth of the saying of Hippocrates that to know the nature of man one must know the nature of all things. But on Harvey's arrival, Padua, which had become the first school of Medicine in Europe, as was Bologna of Imperial Law¹, was settling down upon the lees of the once noble school of Averroes: a discipline which, by its original strength, by its freedom of thought, and by the ascendancy of its professors, had withstood in the thirteenth century the direct condemnation

devastation, but had scarcely deserved its good fortune. There was much active teaching of a routine kind, many formalities, much serving of tables ; but of living interest in science, learning, or high culture there was not a trace. Of classical learning, in Casaubon's sense, there was naught. Ecclesiastical controversies absorbed or overwhelmed all other subjects ; and the University was regarded by the Government as an instrument of party. The professors were all clerks, and ardent only as pamphleteers. Thus, says Pattison, "the University took its full share of national passion, prejudice and religious sentiment, but was wholly destitute of any power to vivify, to correct, to instruct, or to enlighten." Pattison's Casaubon, p. 417.

¹ Both in Bologna and Padua of course there was a faculty of Medicine ; but its tradition in Bologna was traditional and galenical, in Padua independent and progressive. Montpellier had suffered in the desolation of Languedoc.

of the brilliant fourth Lateran Council ; and in the sixteenth the thunders of Trent. Padua adopted Averroism, in the fourteenth century, because of its medical contents ; in the two following centuries this system was emptied of heart and life, but pattered and mumbled by pretentious pedants in North-east Italy it prevailed till the seventeenth, when after a reign of three centuries it was succeeded by the Cartesian. Of its phases in the sixteenth century Patrizzi said, "*Ingens ab his philosophorum numerus ac successio manavit quæ in Aven Rois hypothesibus habitavit.....Inde dubitationum ac quæstionum sexcentorum milium numerus manavit*" (*Disc. Peripat. Vol. I. Venet. 1571* ; quoted by Renan, *Averroès*). The name of Averroes, "*perfectus et gloriosissimus physicus, veritatis amicus et defensor intrepidus,*" became the shibboleth of philosophers who held the different nature of the heavenly bodies against the "moderns" who alleged the identity of matter in sky and earth, and the doctrine of the universal against the individual soul.

Yet, in spite of Petrarch's gibes, Averroism in its spring had nursed Padua with the milk of natural science. Even in its decay—for all teaching of philosophy, as a separate study, must decay—the

triumph of the Faith was premature; like Jansenism, the School of Averroes, effete as it became, held the ground for a more dangerous invasion, for Leonardo, Telesio, Bruno, Gilbert, Sarpi, Campanella, Galileo, and Harvey; for the pioneers of truth, not as consistency with tradition, not as an alchemical search for real essences, nor indeed as wisdom only; but as the verification of premises. This fuse Paracelsus fixed to the shell which burst upon the Faith, upon Scholasticism, upon Galenism, and even upon humanism, "So Christus spricht 'Perscrutamini scripturas'; warum soll ich nicht sagen 'Perscrutamini naturas rerum'?" The *Credo ut intelligam* of Augustine and Anselm of Canterbury; the *Intelligo ut credam* of Aquinas belonged to the past; and men began to cry "c'est Dieu qui nous veut hérétiques." A criticism based upon a larger sense of the relativity of knowledge, and, in the sixteenth century, a new scepticism¹, which pierced even into the Vatican, as to the very possibility of knowledge of the nature of being, were preparing the way for new conceptions: but in ethics meanwhile men were falling either into the carelessness of the scoffer or into the anti-

¹ See page 82.

nomianism of the mystic. The brilliant futilities of the medieval dialectic had led to weariness of spirit. After vain and vexatious jugglings with the dry tissues of unchastened ratiocination, simplicity and even ignorance brought their solace.

As from Florence humanism invaded English letters, so the Averroistic physician of Padua became known, even in Chaucer's day, as a man of secular rather than of Scriptural learning. In Padua, while Galileo was teaching Euclid for a pittance, chairs of Averroistic philosophy were filled by highly paid professors, whose "rotuli" or portfolios, many of which now rest in the dust of the libraries of North Italy, were handed down from one to another in deadly routine. Virtually, however, the Averroistic tradition ended with a contemporary Paduan professor, Cremonini, lifted into fame by Harvey's refutation in the *De motu cordis*, and by his own repudiation of the satellites of Jupiter, bodies for which Aristotle had made no provision. The coarseness and pedantry of the Averroistic freethinkers, whose scepticism lacked the elegance and sprightliness of the French, and their bastard language—mongrel of Greek and Arabic—revolted the humanists also: "Nihil

fiery and turbulent tribes which in the "deep but dazzling darkness" of the Middle Ages raged upon a barren land before the nations began ; and I wonder if the ideas which awed them, swayed them, and welded them into stable societies were fancies as wild and sterile ; and if the men who wrought them were mere traffickers in words. And then I wonder if we are glad that the riddle of the origin and issues of being, which tormented their eager hearts, is not solved, but proved insoluble : if we are glad that "sub specie hominis" the earth, no longer the nursery of eternal souls, is but a meteor in the sky ; men and women but the gleam upon it ; the sons of Heaven but companies of whirling stones, and the Father of Heaven an inaccessible idea.

The scholastic philosophies became inhuman only in their decrepitude. In the equal eye of history, the Middle Ages teach us that the slow and painful travail of natural science is not to be regarded as the belated labour of light in the womb of darkness, nor as a mere stifling of the growth of the human mind by tyranny and oppression, nor indeed as the arming of moral forces against brute forces, but as the condition of time

in the making of societies on a necessarily provisional theory of life. They teach us that conduct in state and morals depends upon a theory of life; that although habits and even standards of ethics may abide for a time after the theory on which they were built is sapped, it is but for a time; that if the social discipline and fruition are to be renewed and enlarged it must be upon a new synthesis, as laborious and ardent as the former, and more true. Meanwhile the business of a nation, whether in war or peace, is first to be quick and strong in action, to be rational afterwards; and swiftness and strength come of union of wills and singleness of heart rather than of wisdom. Even within its borders freedom of opinion must awaken slowly; the nation strong enough to suffer irresolutions in its outward policy has yet to appear. Hence it is that we find in ruling classes, and in social circles which put on aristocratical fashions, that ideas, and especially scientific ideas, are held in sincere aversion and in simulated contempt.

The Greek was no heathen, suckled by nature and endowed only with her instincts; he sought in his mind to improve nature: but in the Renaissance instincts were set as free as thought. In this

passionate and adventurous time to preach the destruction of the animal instincts, or to crush them for the higher life, was a noble idea, but an impossible hope; the animal impulses are to be trained, not suppressed, and for this the help of science was to come. Yet science was to be not the hated rival but a necessary ally of religion. It is not within the province of science to answer the medieval searchings on the nature of being, nevertheless this threshold problem—“*der Drudenfuss auf der Schwelle*”—faces us still; and the world, so far as we have seen of it, has always demanded a provisional answer. To-day Professor James Ward offers it again in “Supreme Intelligence”; and Principal Caird (“Fundamental Christianity”) yearns for the knowledge of infinite being almost in the words of Plato himself:—“If,” he cries, “underneath all the phenomena of the world in which we live we can discern no principle of reason and order, no absolute intelligence and love, then indeed” this world is a “meaningless waste.”

Gilbert Galileo and Harvey, Maxwell Hertz and Darwin have taught men not that the speculations of the schoolmen were over-bold, for they busied themselves with no speculations bolder or

more transcendental than are our modern theories on matter, on inertia, on the ether, or on the origin of life, but that metaphysics by "intercalation of facts" shall become physics, that, in the words of Descartes, concepts, if "*μετὰ τὰ φυσικά*," "*talia sint tantum ut omnibus naturae phænomenis accurate respondeant*," and that notions great and small shall be subjected to strict verification, so far as such tests can be carried; not that men shall deny themselves the rapture of touching that various instrument they find within themselves, but that they shall endure the drudgery of learning to play it in harmony with the orchestra of nature; not that they shall desist from imagining, but that before proclaiming hypotheses they shall be compelled to the humble task of making an infinite number of little piles of facts. The art of experiment can grow only with the growth of science itself; instruments of precision are not provided till men feel the need of them. The experimental verification of concepts is no mere alternative path, no mere renunciation, but a new birth; a birth into a dull and vexatious discipline for the impatient Hegelian, whether of the thirteenth or of the twentieth century, who believes that, as mind is the product of evolution, and so the sum

and store of nature, "in dem Gedanken selbst das Wahre ist zu suchen¹."

"Long fed on boundless hopes, O race of man,
How angrily thou spurn'st all simpler fare."

The genius and courage concerned in a particular discovery or reform it were impossible to estimate; there is no method of determining the specific gravity of such adventures: moreover we are now so well used to the lights, bells, and soundings of the routes of scientific enquiry that it is hard for us to realise the pain and peril of fogs and contrary winds in voyages where were no such guides. Indeed no exposition of defects of methods can explain false habits of thought without a careful estimate of historical causes also, in what we may call the embryology of thought; for at no time were right methods of thought wholly wanting, or even wholly disregarded. But, as we approach Harvey's own time, if on the one hand I have shown that Europe until he came was not ready for him, on the other hand I trust I have made it more easy to conceive the weight of the social

¹ Even Descartes has some share with Hegel in the profound error that whatsoever is clearly and definitely conceived is true. The inference if true for formal logic, is not true for natural processes; for instance, Descartes' well-known attribution of the soul to the pineal gland, because all other parts of the brain are double, and the soul is single!

systems, opinions, and prejudices against which his gigantic effort was made. For, brilliant as was the promise of the Renascence, yet in the time of Harvey, and in the generation immediately before him, the decay of the scholastic methods and the worldliness of the Church, which in the first half of the sixteenth century had favoured the advance of secular culture, had led to a reaction, not against Luther only but also against all liberal learning and science. In the Vatican, in the Sorbonne, in the Consistory, and even in the courts of justice it was proclaimed that as these studies make government more difficult, it were ill to encourage them ! We have seen that the Faith, though undermined and no longer catholic, was aroused, and was terrible still ; orthodoxy was crushing free thought in Italy ; Alva was in Flanders, and had been visited by Catherine de Medici at Bayonne ; in France the ruthless religious wars ended in the triumph of Rome ; Europe was overrun by Dominicans and Franciscans ; Trent was long pregnant with anathema. Contrary sects alike defied liberal culture ; and four years before Harvey's birth the wolf, hidden under another cloak, had torn Servetus—Servetus who shared with Colombo the honour of preparing the way for

the founder of modern physiology. Even the genial conformist of the world, after his manner when he is scared, had turned brutal; he felt that the old conceptions upon which society was built for him, were suspected, and therewith society itself beginning to crack and split, yet he did not see that now by science only could society be recreated.

In Italy the Cinque Cento had taken its birth and nourishment chiefly from Latin sources and tradition. It regarded symmetry of form and rhetorical modes of passion; elegance was preferred to matter, and style to knowledge. Such a culture had not the seeds of life in it; in the middle of the sixteenth century its enthusiasms waned, its philosophy fell into routine, its style into mannerism; but science, not philosophy, not the Faith, was the heir of the Middle Ages. Science is not of Latin but of Greek inheritance, its sources are Greek; and with the westward swarm of the Greeks their older boons of eloquence and beauty were rivalled by their newer gifts of scholarship and natural knowledge. In France the leaders of this school were the Huguenots, the flower of the nation; in the Catholic reaction of the sixteenth century France scorched her own bloom,

and Spain was blasted for ever. The humanists, who at best were false friends of science and medicine, were no longer powerful friends; their noble rage was suppressed by chill penury, and many of the most learned and zealous of them were vagabonds in Europe. Rhetoric, fine art, and even philosophy may flourish in slavery, learning and science can breathe no air but that of freedom; and freedom of learning was quenched in the blood of the Massacre of St Bartholomew. In 1540 had been founded the Society of Jesus, which then as now used science and learning, not as sources of truth or tests of conduct, but as tactics; putting on indeed the habit of the scholar, but only the more effectually to control research. Two years later the Spanish Inquisition was set up in Rome; and its shadow fell even over Venice, which abased itself to the imprisonment of Bruno. The great Venetian printers, some time reduced to the publications of decadent Averroism (p. 97), to avert bankruptcy had to print breviaries. Henry of Navarre, deserting Du Plessis Mornay, D'Aubigné, and De Thou, turned not only Roman Catholic but also ultramontane; and, if with his accession the Terror had ceased, social and political ostracisms, tests, and disabilities stifled all generous culture.

The great University of Paris, which throughout the Middle Ages had been the heart of Christendom, the centre of its life and heat, which in the fourteenth century was at its splendid culmination, and which had meddled with no feeble hand even in the State, was waning even in the fifteenth century, when France was devastated by war and rapine and her schools were emptied. This University, which had savagely condemned Joan of Arc, and sent Nicholas Midi to preach a solemn sermon at the stake, "pro Joannæ salutari admonitione et populi ædificatione," in the sixteenth century came out of the religious wars stripped of its endowments, and deserted by its students; its curriculum was crassly conservative, its philosophy buckram, its theology a petrification; its forty colleges were closed, grass grew in its courts, and its public disputations were abased to the decorous apostasy of the freethinker. Montpellier was dominated by realism (vitalism). Francis Bacon had done better to have gone with Harvey to Padua; almost in the year of the publication of the *De motu cordis*, the Parliament of Paris issued an edict that no teacher should promulgate anything contrary to the accepted doctrines of the ancients.

Such was the check which, after the death of Leo the Tenth, had befallen liberal studies: no Bembo now secretly protected freethinkers; in Central Europe the generous Maximilian the Second, who died in 1576 while counselling tolerance in religion to Henry the Third, was followed by reactionary emperors. In England no doubt the sky was clearer; in the Salamis of modern civilization the malign pretensions of Philip were shattered, and the "spacious times of Elizabeth" were glorious in their outburst of freedom, adventure, and culture. Medicine, however, sinking in the sixteenth century, fell, in the seventeenth, into that reproach which has become a byword. All superstition was not within the Faith. When Harvey's discovery, like an earthquake, had broken up galenism and other outworn sophistries, his masterly work stood forth not only against long-winded dialectics on *ars sphygmica*, critical days, coctions, derivatives, revulsives, and like abstractions bequeathed by realism and uncritical subservience to texts, but also against a more lurid background of folk superstitions—of vampires, witch-burning, magic, cabbalism, astrology, alchemy, chiromancy, and water-casting. For medicine, says Bacon, is associated with charlatanry as Aesculapius with

Circe. In physics, terrestrial and celestial, Galileo, persecuted as he was, had some current with him and before him ; Copernicus had preceded him, Kepler was beside him : but in physiology the waters had closed upon the path of Galen as upon the wake of a great ship ; the anatomists, themselves galenists, had given Harvey little help ; and the share of Servetus¹, Colombo, and Fabricius was but small in the discovery of the central fact of the science, and of the method which opened the way to Pecquet and Aselli, to Glisson, to Steno, to Wharton and Willis, to Haller and Bernard. Harvey's discovery was the first step to a transfiguration of medicine ; and though after Harvey there arose much false physiology and therewith again great floods of medical sophistry, yet from his time medicine has had to reckon with physiology, the only source of scientific nosology and therapeutics.

We celebrate the memory of great men in the certain hope that in their children they will be born again.

¹ "The share of Servetus was small" ; that is, the effect of his remarkable discovery was small, for it was buried in a theological work of which but a few copies were rescued from the burning ; namely "Christianismi restitutio. Viennæ Allobrogum, 1553." (Haeser gives the reference to pp. 170—177, De Trinitate divina.) The work was reprinted at Nuremberg in 1790.

APPENDIX.

ASTROLOGY.

Besides those greater preventions which lay in the very structure and organised conceptions of society in the Middle Ages, the student of natural science was thwarted also by many lesser, which could not find place in this oration. Among the chief of these was judicial astrology, which supplanted and degraded the art of medicine.

It is difficult to carry the imagination into a time when the heavens were conceived as an animate and divine being¹, the heavenly bodies as active and intelligent parts of it, and the whole set not in illimitable space but around man and his home, and waiting upon him (vid. p. 47); yet without such an effort we cannot realise the ancient place and dominion of astrology. Such a possession when in its strength must have enthralled the human mind; and it abode tenaciously with the first scientific conceptions of celestial phenomena, even in the thoughts of the enlightened. Tycho Brahe, for many years of his life, was an adept; and even Kepler saw

¹ Quæ, simul æthereos animo conceperat ignes,
Ore dabat vero carmina plena dei.

Ovid, *Fasti* l. 473.



portents in the skies. When we read the doctrines of Aristotle on the celestial beings, it is indeed somewhat strange that upon him, upon Plato, and upon the Ionians, the "judicia astrorum" had even less hold than the mythology: so truly poised, even in the infancy of science, were the cosmic speculations of this wonderful race. The Romans by their Etruscan tradition held to astrology, chiefly derived from Chaldea and Egypt, and by them it was mixed with grosser folk magic; yet even in Rome there were many to repudiate it, not only such Grecian spirits as Cicero but also such Romans as Juvenal; as in Harvey's time it was assailed by the irony of Pascal and of La Fontaine. Even in the twelfth century John of Salisbury had not failed to turn his light artillery upon astrology.

This art of forecast naturally attached itself closely to that of medicine; and in its decrepitude still it clung to medicine like a parasite. And as parasites in the field of pathology, so astrology brought with it other noxious superstitions and follies even worse than itself. In England it survived till the witty attack of Swift killed Partridge and astrology together; yet to this day many of its notions are embedded in our common speech.

Ptolemy among his good services did one ill to mankind by his *Tetrabiblon* or "Quadripertit," an astrological treatise which was current with the *Almagest* in the Western Schools. This authoritative treatise, together with the Aristotelian conception of the heavens, gave to astrology the aspect of a regular science with its own principles and methods; a science admired and

even courted by princes. As Frederick the Second and Charles the Fifth would learn of the stars the moment to take the field against their foes, so the medieval physician sought their countenance in the letting of blood or in the exhibition of a clyster or emetic. The Church, abhorring all concurrent dominion, and justly abhorring this bondage of the judgment of God and of the will of man, almost alone withstood the astrologer. If the doctors of theology did not know how to deny the power of the stars in the material cosmos, they vehemently denied it in the world of the spirit. "Et ideo pro certo tenendum est," says Aquinas, "grave peccatum esse circa ea quæ a voluntate hominis dependent judiciis astrorum uti." Of the priestly assailants of astrology, the most attractive to us for his wit, sagacity and sound knowledge, was Nicholas Oresme, sometime Bishop of Lisieux (died 1382), translator of the *Ethics* and other Aristotelian treatises, as he is portrayed for us by Hauréau (*Dict. des Sciences philosophiques*, art. Oresme) and M. Charles Jourdain. The fun of the thing is that the outspoken Oresme was the counsellor, the friend, and even the tutor of that notable astrologer Charles the Fifth; a story as honourable to the prince as to the subject. As Charles issued from the chambers of his astrologers the discourses of Oresme must have made him a little uncomfortable, especially when Oresme records the misfortunes of astrologising captains, such as Alphonso king of Castille, of whom, says he, I have heard nothing notable except that he cast horoscopes, was unfortunate in war, and neglected

his kingdom; or such again as James the king of Majorca, a passionate astrologer, who on the dictation of the stars made a sortie against Peter of Aragon, and never came back again. It is all very well, says Oresme, for kings to know somewhat of the noble science of astronomy, but they must be content to hear of it in talk with sages, and not to spend upon the stars time and care which they should devote to the interests of their people. "Mesmement tele chose (astrology, necromancy, geomancy and "quelconques tels ars") est plus périlleuse à personnes d'estat, comme sont princes et seigneurs ausquelz appartient le gouvernement publique. Et pour ce ay je composé ce livret en françois afin que gens laïcs le puissent entendre, desquels, si comme j'ay entendu, plusieurs sont trop enclins à telles fatuités. Et autres fois ay je escript en latin de ceste matière" etc. In spite of the Bishop of Lisieux, astrology at the end of the fourteenth century reached the summit of its influence and popularity. In the course of his argument Oresme gives an admirable account of the nature of hallucination and the parts it may play in perverting knowledge; not only so but he explains also the fallibility of the normal senses in respect of organic defects, of media, of false inference, of association, of imposition of the imagination, and so forth. Under such circumstances, he says, a mystic might conceive himself to have been visited by an angel!

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